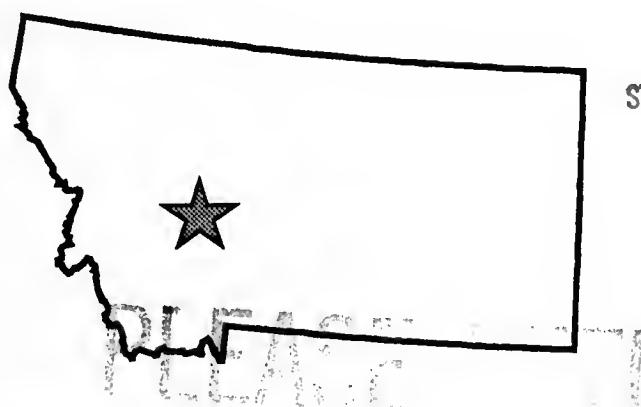


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1406 Fort Creek Road S., #101 Bellevue, NE 68005
Phone (402) 291-2362 • Fax (402) 291-2836

With Subcontractor Assistance from:

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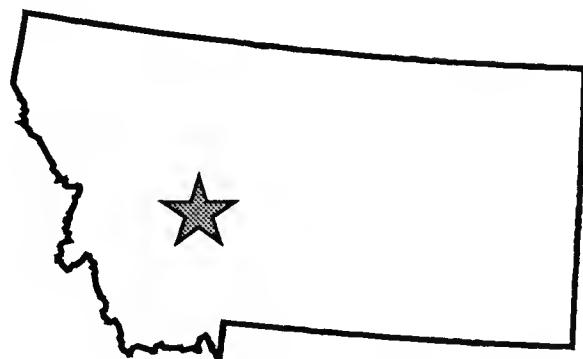
Albert Harting Consulting Wildlife Biologist

414 North Plum Avenue
Bozeman, Montana 59715
Tel/Fax 406-585-8120 • E-Mail: Harting@mcn.net

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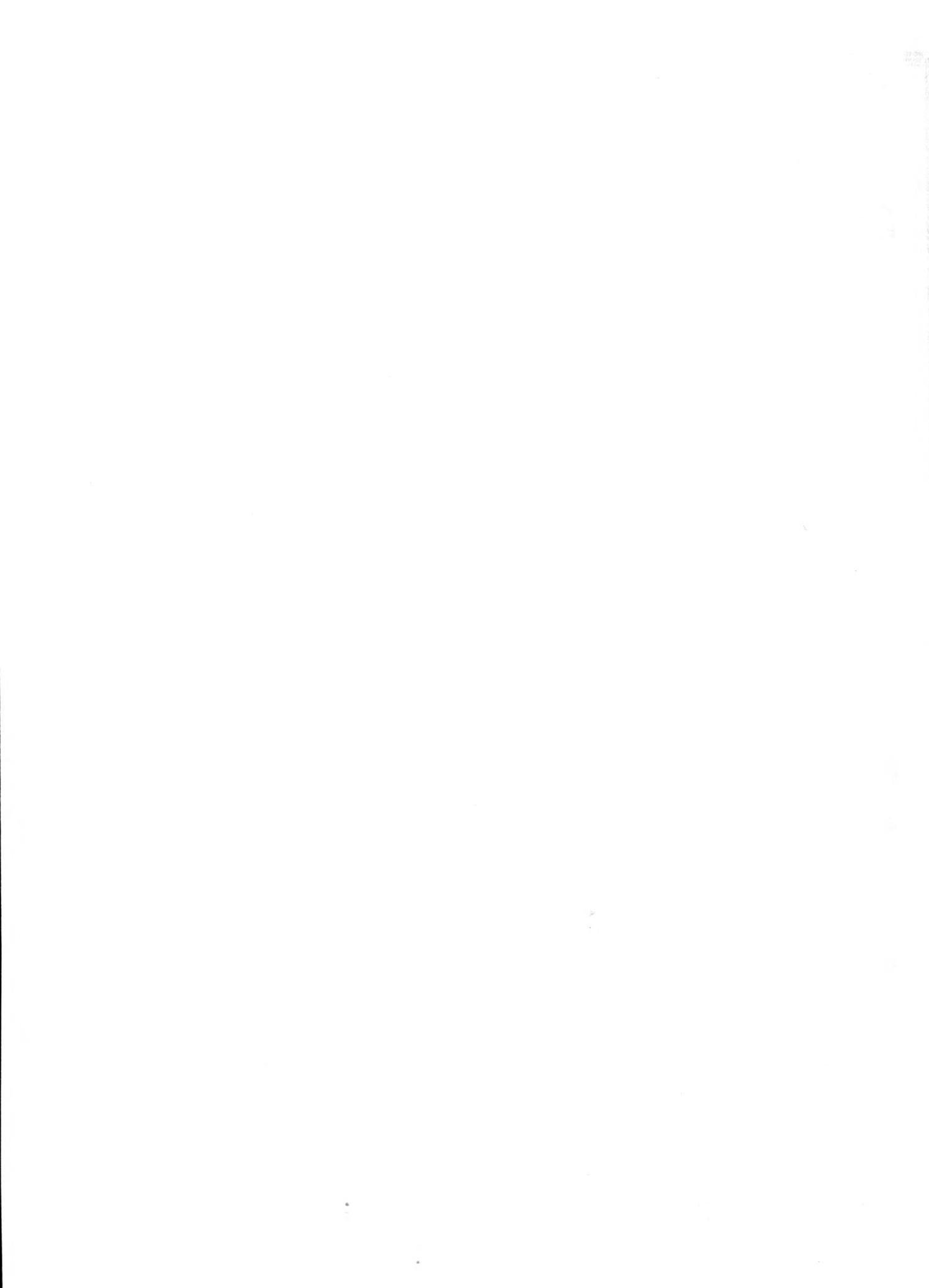
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**MONTANA
ARMY NATIONAL GUARD**

September 1996



EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

PURPOSE AND SCOPE

The Montana Army National Guard (MT ARNG) is proposing to purchase 897 acres of land from private landowners and withdraw 100 acres of Bureau of Land Management land. These properties are west of and adjacent to Fort William Henry Harrison (Fort Harrison) near Helena, Montana. This action is necessary to ensure that existing small arms ranges and training areas on Fort Harrison remain usable in the future.

This environmental assessment is prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA, and Army Regulation 200-2. This environmental assessment evaluates the proposed land acquisition, an alternative for partial acquisition of the proposed parcel, and the No Action Alternative.

THE PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is for the MT ARNG to purchase, through fee-simple acquisition, land currently leased from private landowners. The Proposed Action would also include the withdrawal of Bureau of Land Management land. The MT ARNG's need to secure land west of Fort Harrison is to ensure that the existing small arms ranges and associated safety fans, and training areas, remain usable into the future. The Fort Harrison complex provides various military training opportunities. Operations and training activities at Fort Harrison would not change with the proposed land purchase. Fort Harrison contains several firing ranges (e.g., pistol range, M16 zero range, M16 qualification range, M203 range, M72 range) that are within Fort Harrison but not located on the proposed acquisition property (parcel). However, surface danger zones for the M16 and M60 ranges extend into the proposed parcel.

Fort Harrison also provides Military Operational Specialty Qualification Schools: dismounted infantry training, land navigation courses, thermal targets for M1 tank lane training, bivouac areas, special operations training, and helicopter training.

Currently, the MT ARNG has lease agreements with five private landowners who allow the MT ARNG to use the land for a variety of purposes: part of the small arms range surface danger zones; a land navigation course; dismounted infantry tactics; a drop zone; and as a tracked/wheeled vehicle driving track.

Future use of this property, if purchased from the landowners, would not differ from the current land use. No new construction would occur, and no new personnel would be required to support the Proposed Action. The U.S. Army Corps of Engineers handles real estate acquisitions for the Department of Defense and is involved in the planning of this land acquisition for the MT ARNG.

The Partial Acquisition Alternative analyzed in this environmental assessment assumes that Congress may only issue a portion of the money required to purchase the land. Consequently, only a portion of the subject land could be purchased in this fiscal year and the additional land in another year.

The No Action Alternative would be for the MT ARNG to continue to lease the land. Availability of Federal funding for each year affects the ability to maintain the leases. If no land purchase occurs, it is likely that at least one of the existing leases with private landowners would not be renewed and some type of private development would occur. If the land were withdrawn from the Fort Harrison training complex and development occurred (e.g., construction of homes or other buildings), the loss of training capability would create an adverse and significant impact on the U.S. Army and other Federal agencies. The M16 and M60 firing training ranges would be closed because the safety fans would no longer be in controlled areas. Army regulations prohibit operation of firing ranges with buildings, structures, or people present inside the surface danger zone.

Four additional alternatives were considered but eliminated from further consideration: Purchase Development Rights and Maintain Lease; Relocate all Ranges and Training to Limestone Hills; Relocate all Ranges and Training to Another Location; and Reconfigure all Training Ranges Within the Area Already Owned by Fort Harrison.

SUMMARY OF POTENTIAL IMPACTS

The following environmental and socioeconomic resource areas were analyzed for potential impacts associated with the Proposed Action, Partial Acquisition Alternative, and No Action Alternative. As appropriate, possible mitigation measures were suggested. No cumulatively significant impacts were identified for the Proposed Action or the alternatives. Fort Harrison has additional capacity to expand its mission without significantly affecting the environment.

Operations and Safety. Existing operations are conducted according to safety requirements. The Proposed Action would not result in any increased aircraft or ground operations at Fort Harrison. Some existing ground activities may disperse into the acquisition parcel. Consequently, assuming a relatively constant level of operations, less activity would occur in the existing training area. A beneficial impact to range safety would occur through the acquisition of land within the surface danger zones and the M60 range fan. For the Partial Acquisition Alternative, a slight benefit to safety would occur from acquiring a portion of the subject land. If private development of the unacquired portion of the parcel occurred, mission safety would be adversely but insignificantly affected, while operations could be significantly affected. Under the No Action Alternative, no impact would occur to range safety if the area continued to be leased, and an insignificant impact to range safety would occur if private development occurred. However, if private development occurred, the M16 and M60 ranges would have to close; range operations, as well as the mission viability of Fort Harrison, would be significantly impacted.

Air Quality. The existing MT ARNG activities and use of the training areas have minimal impacts on air quality in the Helena area. No impacts to air quality would occur from the Proposed Action. An air conformity determination is not needed for the ongoing or proposed MT ARNG activities. The emissions from MT ARNG activities would not affect the non-attainment area near East Helena, and would not affect the current attainment classification of the surrounding region. Under the Partial Acquisition Alternative and the No Action Alternative, continued leasing of the land would result in no adverse impacts to air quality; however, if private development occurred, air quality could be insignificantly affected.

Geological Resources. Existing activities have no adverse impacts on geological resources. The Proposed Action would cause no impacts to the geology, physiography, and seismicity of the parcel, and an insignificant impact to soils and minerals. The same type and level of impacts would occur under the Partial Acquisition Alternative and the No Action Alternative if the land were continued to be leased. However, if private development of mineral resources or construction occurred, significant impacts to soils and minerals could occur.

Water Resources. Existing activities do not adversely impact water resources (surface water, groundwater, and water quality). Implementation of the Proposed Action would also not impact water resources, as would continued leasing under the evaluated alternatives. If private development occurred under the Partial Acquisition Alternative or No Action Alternative, water resources would likely be insignificantly impacted.

Biological Resources. Impacts to biological resources from existing activities on Fort Harrison are insignificant and result primarily from foot and vehicular traffic, bivouacs, occasional helicopter flyovers, and noxious weed control; however, these activities do not lead to degradation of critical habitat or risk the viability of threatened or endangered (T&E) flora or fauna. Under the Proposed Action or the evaluated alternatives, sensitive or T&E species would not be impacted. Implementation of the Proposed Action would result in insignificant impacts to vegetation, wildlife, and wetlands; impacts to these biological resources would likely be insignificant under the alternatives analyzed. However, private development of a wetland under the Partial Acquisition Alternative or the No Action Alternative could cause significant impacts. Spraying for noxious weeds in the upgradient portion of the wetland should not be done by aerial application; truck or backpack spraying should be used for spot application as needed. A wetlands delineation should be performed to document the extent of the wetland and assist in the planning of activities surrounding this special resource. Identification and delineation of the wet area that does not meet the definition of a wetland could also be determined.

Cultural Resources. Existing activities such as foot and vehicular traffic, bivouacs, and helicopter flyovers do not impact cultural resources on Fort Harrison. There has not been any degradation of unique archeological resources or the destruction of structures listed or eligible for listing on the National Register of Historic Places (NRHP) from existing activities at Fort Harrison. Implementation of the Proposed Action, Partial Acquisition Alternative, or No Action Alternative would not result in any significant impacts to cultural resources; the acquisition area has been surveyed (and results recorded in a report) for cultural resources and no NRHP-eligible features have been found. Consequently, any disturbance of these resources would be insignificant.

Noise. Existing activities have no adverse noise impacts. Sensitive receptors are avoided during helicopter flyovers and the ranges are designed with noise zones to minimize the possibility of noise complaints. The Proposed Action of purchasing additional properties would not result in any increased aircraft or ground noise at Fort Harrison. Some existing ground training operations would expand into the acquired parcel, thus negligibly reducing current noise levels wherever the activities were occurring. The effect of the Proposed Action would cause no impact to noise levels in the area; the same effect would occur under the evaluated alternatives if the subject land continued to be leased. If private development occurred within the currently leased areas, insignificant noise impacts could occur under the Partial Acquisition Alternative and potentially

significant noise impacts could occur under the No Action Alternative. (The difference in impacts is because the No Action Alternative could allow development within an incompatible noise zone.)

Socioeconomic Resources. As a result of the Proposed Action, impacts to socioeconomic resources in the region of influence (Lewis and Clark County) are expected to be insignificantly beneficial. Purchase of the land would benefit the current landowners and their communities, making these funds available for investment or spending. Under the Partial Acquisition Alternative, there would be a smaller benefit than the Proposed Action. The No Action Alternative would not impact socioeconomic resources. If private development occurred in the subject parcel, training and other range activities would be reduced and possibly moved to another location. There would be insignificant adverse impacts to the Helena area, since there would be fewer visitors to Fort Harrison.

Land Use. Existing activities have no adverse impacts on land use or sensitive receptors adjacent to Fort Harrison. The Proposed Action would continue to restrict land use on the acquisition parcel because of safety fans, but this is considered to be an insignificant impact on land use. The Partial Acquisition Alternative and No Action Alternatives would have an insignificant impact on land use. If private development occurred because only a portion or none of the acquisition parcel was purchased, shutdown of any ranges or the airstrip would cause noise levels on surrounding land uses to decrease for the short-term; however, depending on future use of the land, noise levels could increase in the long-term. Impacts to the value of adjacent land would also depend on the future use of the land that is currently leased by Fort Harrison.

Environmental Programs. The ongoing MT ARNG operations have insignificant impacts on environmental programs. Based on MT ARNG pollution prevention efforts, there may be lesser amounts of hazardous materials used or wastes (solid, hazardous, and water) generated as the training activities are continued. No significant impacts would occur from implementing the Proposed Action. Although identified Installation Restoration Program sites would not be affected by the Proposed Action, there is a potential for soil contamination on the acquisition property from past mining activities, and from target practice by the MT ARNG. No significant impacts to environmental programs are projected for implementing either the Partial Acquisition Alternative or the No Action Alternative.

To ensure that no contaminants are being released or will be released from old mining sites, a review of the mining sites located on the acquisition parcel should be conducted. Closing of open mine shafts may be needed as a result of the review. Although lead from spent munitions is not likely to be mobilized in the dry conditions at the acquisition parcel (and because the lead is found in large pieces), a study of the area with respect to lead contamination should be conducted. A review of the potential hazards from unexploded ordnance on the acquisition parcel should also be conducted.

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ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

AASF	Army Aviation Support Facility
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CTA	Collective Training Area
dB	decibel
dBA	“A-weighted” decibel
dB _P	linear peak sound level
DMAMT	Department of Military Affairs—Montana
DoD	Department of Defense
DOPAA	Description of Proposed Action and Alternatives
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPCRA	Environmental Planning and Community Right-to-Know Act
ESA	Endangered Species Act
HAP	hazardous air pollutants
HUD	Housing and Urban Development
HVFAS	Helena Valley-Fill Aquifer System
ICUZ	Installation Compatible Use Zone
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IRP	Installation Restoration Program
L _{dn}	average sound level
MAAQS	Montana Ambient Air Quality Standards
MCL	maximum contaminant level
mg/L	milligrams per liter
MOSQ	Military Operational Speciality Qualification
MPH	miles per hour
MT ARNG	Montana Army National Guard
MTDMA	Montana Department of Military Affairs
MTRTI	Montana Regional Training Institute

NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO ₂	nitrogen dioxide
NO _x	nitrogen oxide
NRHP	National Register of Historic Places
O ₃	ozone
ODS	ozone depleting substance
Pb	lead
PCI	per capita income
PM ₁₀	particulate matter
ppm	parts per million
PSD	prevention of significant deterioration
RCRA	Resource Conservation and Recovery Act
ROI	region of influence
SARA	Superfund Amendments and Reauthorization Act
SEAL	sea, air, and land
SEL	sound exposure level
SOP	Standard Operating Procedure
SO ₂	sulfur dioxide
tpy	tons per year
ug/L	micrograms per liter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UXO	unexploded ordnance
VA	Veterans Administration
VOC	volatile organic compound

CHAPTER 1

PURPOSE OF AND NEED FOR

PROPOSED ACTION

1 PURPOSE OF AND NEED FOR ACTION**1.1 INTRODUCTION**

The Montana Army National Guard (MT ARNG) is proposing to purchase 897 acres of land from private landowners and withdraw 100 acres of Bureau of Land Management (BLM) land. These properties are west of and adjacent to Fort William Henry Harrison (Fort Harrison) near Helena, Montana. This action is necessary to ensure that existing small arms ranges and training areas on Fort Harrison remain usable in the future.

1.2 PURPOSE AND NEED

Fort Harrison is the only Army training post in Montana and serves as the focal point for the majority of all Army training in Montana. Fort Harrison's mission is to provide training areas and facilities for the Army National Guard, Army Reserve, and active duty military. Fort Harrison contains a cantonment area (with billeting, messing, latrine facilities, and site support operations), ranges for small arms qualification, a drop zone, and a helicopter landing area. Fort Harrison is classified as a Collective Training Area (CTA). CTAs are designed to support individual and collective training up to battalion level. CTAs include small arms ranges, cantonment facilities, and maneuver areas.

Real estate development in the near vicinity of the installation has raised safety concerns. Additional development could compromise public safety due to the proximity of some private property to the Fort Harrison firing ranges. Safety fans for existing firing ranges at Fort Harrison extend onto land leased by Fort Harrison. If any of the landowners were not to renew a lease, it would adversely affect training at Fort Harrison.

Fort Harrison has leased the land proposed for purchase for the past four years. The initial leases are for five-year terms. The leases may then be renewed annually, but may also be terminated by either party. Prior to leasing the property, Fort Harrison had no-cost land use agreements with the private landowners. Prior to the land use agreements, the MT ARNG used the land with no compensation to the landowners.

1.3 PROJECT LOCATION

Fort Harrison is located approximately 3 miles west of Helena. Helena is located in west-central Montana on the south side of an intermontane valley bounded on the west and south by the main chain of the Rocky Mountains. This valley is about 25 miles from north to south and 35 miles from east to west. The average height of the mountains above the valley floor is about 3,000 feet. Figure 1.3-1 illustrates the local region.

Fort Harrison comprises 2,154 acres. An additional 1,727 acres are leased, and 3,580 acres are used with a land use permit. The Fort Harrison Veterans Administration (VA) Center is directly south of Fort Harrison. The VA Center is an independent federal facility administered by the Department of Veterans Affairs.

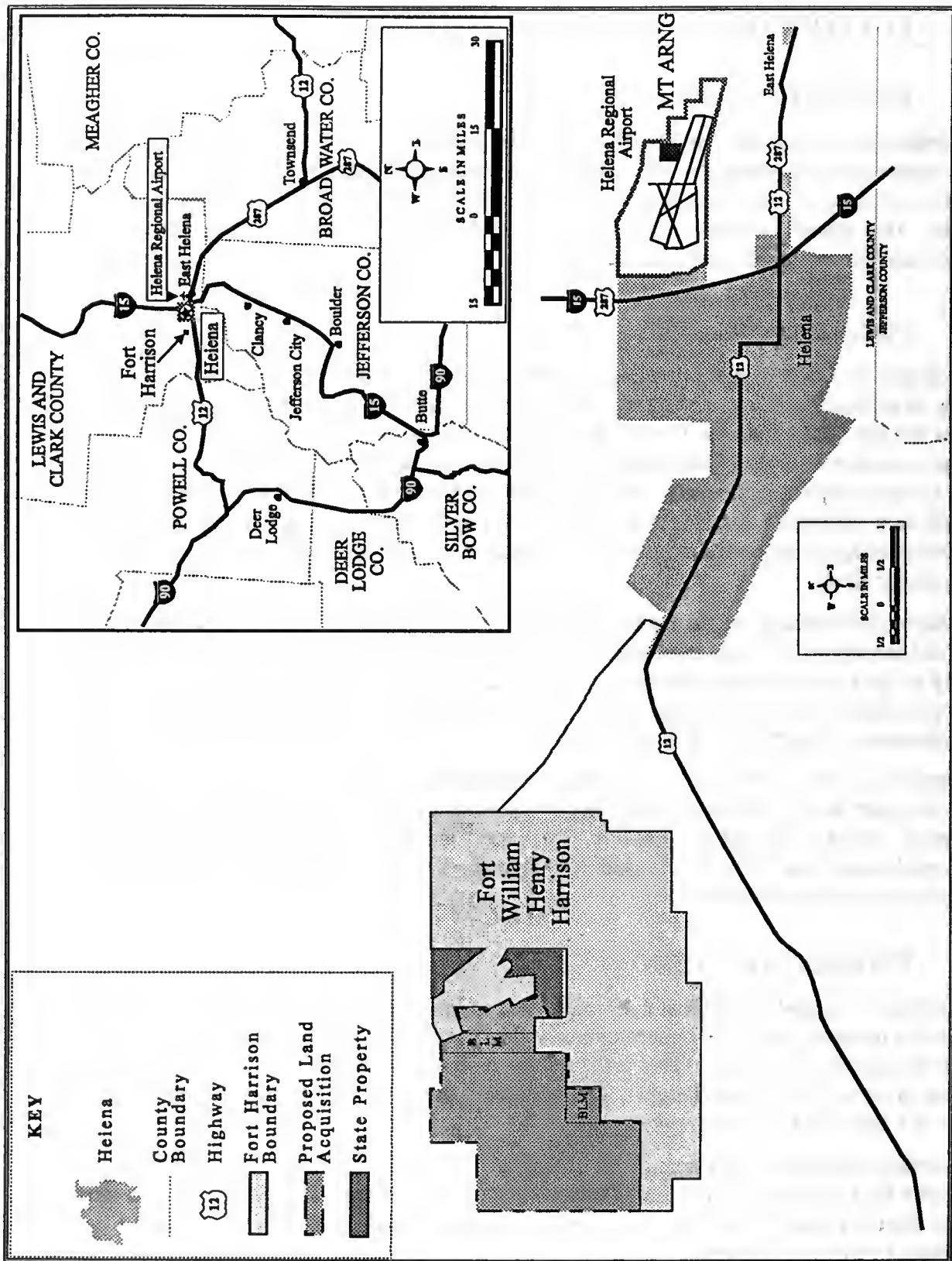


Figure 1.3-1 Fort Harrison and Vicinity

The MT ARNG headquarters is located in Helena, in Lewis and Clark County. The Army Aviation Support Facility (AASF) and the MT ARNG helicopters are located at the Helena Regional Airport. The Helena Airport is located on the eastern city limits of the city of Helena, approximately 5 miles east of Fort Harrison. The airport is owned and operated by the Helena Regional Airport Authority. The Airport serves a population of approximately 47,000 persons, with over 70 percent of these persons living in Lewis and Clark County.

1.4 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The National Environmental Policy Act (NEPA) of 1969, as amended, requires federal agencies to consider environmental consequences in their decision-making process. The President's Council on Environmental Quality (CEQ) issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. The Environmental Impact Analysis Process is governed by Army Regulation 200-2, *Environmental Effects of Army Actions*, and is the mechanism by which the Army assures its decisions include an understanding of potential environmental consequences. The CEQ regulations are used in conjunction with Army Regulation 200-2 to determine the appropriate documentation with regard to the level of environmental analysis.

This environmental assessment (EA) evaluates the proposed land acquisition and an alternative for partial purchase of the proposed parcel. The approach used for this EA was to identify and describe the Proposed Action and alternatives in Chapter 2. Chapter 3 (Affected Environment) describes military activities that occur on Fort Harrison and the AASF, and also describes the environment that can be affected by these activities. Chapter 4 (Environmental Consequences) addresses potential impacts to the biological, physical, and human environs of the acquisition parcel from the proposed land purchase. In addition to addressing potential impacts from the Proposed Action, Chapter 4 summarizes impacts to Fort Harrison from existing activities.

1.5 SCOPING PROCESS

To assist in identifying potential significant issues, Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) was conducted with Federal, state, and local agencies. Issues identified by the IICEP process are addressed in the EA. Potential issues were also identified through discussions with representatives from the MT ARNG. A copy of the IICEP letter and the list of agencies who received the letter are found in Appendix A. A Description of Proposed Action and Alternatives (DOPAA) was provided with the IICEP letter. Specific issues of potential concern include public health and safety, water and mineral rights, wetlands, potential historic sites, and real estate values.

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CHAPTER 2

DESCRIPTION OF THE PROPOSED ACTION

AND ALTERNATIVES

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The MT ARNG is proposing to acquire additional land, currently leased, to support the mission at Fort Harrison. This chapter describes the mission, Proposed Action, and alternative actions (some of which are eliminated from further consideration). Ongoing and future developments at Fort Harrison are discussed, and the chapter concludes with a summary of potential impacts that could be caused by implementing the Proposed Action or alternatives.

2.1 INTRODUCTION

The MT ARNG is charged with meeting the mandate of the Constitutions of the United States and Montana, and to ensure the domestic tranquility through selfless and caring service. This is performed by providing emergency support to civil authorities as directed by the Governor, providing support to the community as approved by proper authority, and providing mission-ready forces to the Federal Government as directed by the President.

The MT ARNG's need to secure land west of Fort Harrison is to ensure that the existing small arms ranges and associated safety fans (see Figure 2.1-1), and training areas, remain usable into the future. The Fort Harrison complex provides various military training opportunities. Operations and training activities at Fort Harrison would not change with the proposed land purchase. Fort Harrison contains several firing ranges (pistol range, M16 zero (sighting) range, M16 qualification range, M203 range, M72 range) that are within Fort Harrison but not located on the proposed acquisition property. These firing ranges are described in detail in Section 3.1.1, Current Operations. The safety fans for the M16 and M60 ranges comprise almost the entire proposed acquisition area (see Figure 2.1-1).

Fort Harrison also provides Military Operational Specialty Qualification (MOSQ) Schools; dismounted infantry training; land navigation courses; thermal targets for M1 tank lane training; bivouac areas; special operations training; and helicopter training. These activities are described in detail in Section 3.1.1, Current Operations.

2.2 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is for the MT ARNG to purchase, through fee-simple acquisition, a total of 897 acres of land currently leased from private landowners. The Proposed Action would also include the withdrawal of 100 acres of BLM land. Figure 2.2-1 shows the approximate location of the privately-owned parcels and the larger BLM parcels; several very small BLM parcels to be transferred are not shown on the figure.

The land proposed for purchase has a varied topography. Most of the terrain is moderately to steeply sloping open grasslands. The open slopes are dissected by gullies, ravines, and coulees that form cutbanks and locally rugged terrain in association with draws and coulees. The area is essentially devoid of trees, except for two areas where cottonwoods are found. Grasslands are composed of a mixture of native and introduced annual and perennial species.

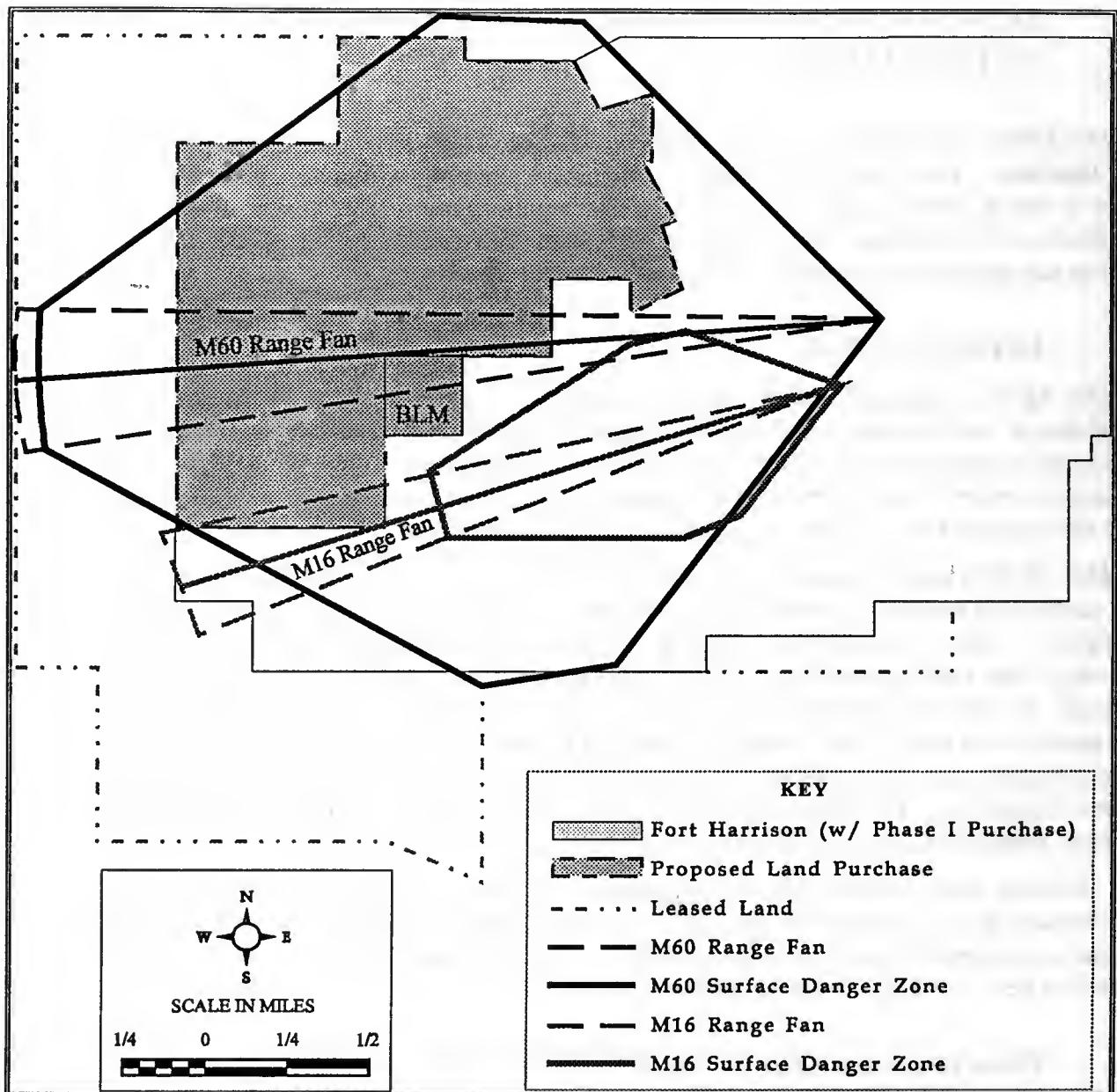


Figure 2.1-1 Range Fans and Surface Danger Zones at Fort Harrison

Currently, the MT ARNG has lease agreements with five private landowners who allow the MT ARNG to use the land for a variety of purposes: part of the small arms range surface danger zones; a land navigation course; dismounted infantry tactics; a drop zone; and as a tracked/wheeled vehicle driving track.

Future use of this property, if purchased from the landowners, would not differ from the current land use. No new construction would occur, and no new personnel would be required to support the Proposed Action. The U.S. Army Corps of Engineers handles real estate acquisitions for the Department of Defense and is involved in the planning of this land acquisition for the MT ARNG.

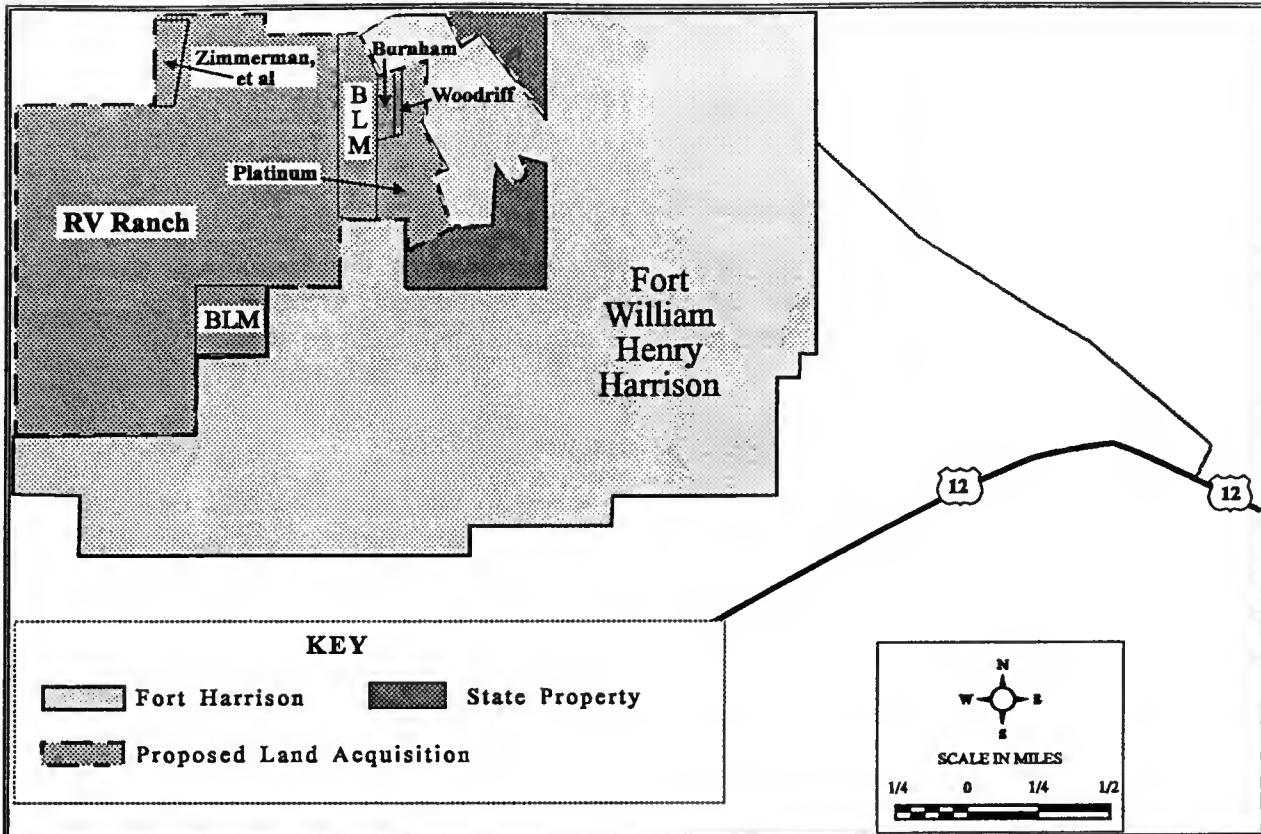


Figure 2.2-1 Proposed Property Acquisition

2.3 PARTIAL ACQUISITION ALTERNATIVE

Congress may only issue a portion of the money required to purchase the land. Consequently, only a portion of the subject land could be purchased in this fiscal year, with the additional land purchased in another year. This alternative is evaluated assuming half the proposed parcel is purchased initially. The land acquired under this alternative is assumed to be the eastern portion of the proposed parcel (i.e., the land closest to Fort Harrison).

2.4 NO ACTION ALTERNATIVE

The No Action Alternative would be for the MT ARNG to continue to lease the land. Availability of Federal funding for each year affects the ability to maintain the leases. If no land purchase occurs, it is likely that at least one of the existing leases with private landowners would not be renewed and some type of residential or commercial development would occur. If the land were withdrawn from the Fort Harrison training complex and development occurred (e.g., construction of homes or other buildings), the loss of training capability would create an adverse and significant impact on the U.S. Army and other Federal agencies. The M16 and M60 firing training ranges would be closed because the safety fans would no longer be in controlled areas. Army regulations prohibit operation of firing ranges with buildings, structures, or people present inside the surface danger zone.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

The following section identifies four alternatives considered but eliminated from further consideration. The rationale for eliminating these alternatives is discussed under each alternative.

2.5.1 Purchase Development Rights and Maintain Lease

Consideration was given to maintaining the current lease and purchasing the development rights. The government does not prefer this option because there are major costs involved, without the benefit of land ownership. The cost to purchase development rights would be similar to that of buying the land.

2.5.2 Relocate all Ranges and Training to Limestone Hills

Consideration was given to relocating all training and ranges to the Limestone Hills area (see Figure 2.5-1). BLM has already stated that they would not authorize any new ranges until an EA or environmental impact statement (EIS) was prepared for withdrawal of the land. Regulations for new ranges are more stringent than for existing ranges, so there would be an astronomical cost (approximately \$1 million per range) involved with relocating and constructing new ranges. New requirements include control towers, automated pop-up targets, increased power, additional right-of-ways, and additional litter cover. The Limestone Hills area is already restricted from military use from November 30 to April 15; meeting training requirements may not occur given the timeframe restrictions and expanded use of the area.

2.5.3 Relocate all Ranges and Training to Another Location

Consideration was given to relocating all ranges and training to a location other than Fort Harrison or Limestone Hills. There are no other desirable locations; other units in Montana (including Malmstrom Air Force Base and state and local groups) and Federal units come to Helena for their training. This alternative would require the purchase of new land as well as the costs to move and construct all new ranges (discussed in the previous subsection).

2.5.4 Reconfigure all Training Ranges Within the Area Already Owned by Fort Harrison

The land currently owned by Fort Harrison is not large enough to fit all the training ranges with their associated safety fans. Therefore, this alternative is not considered viable and was eliminated from further discussion.

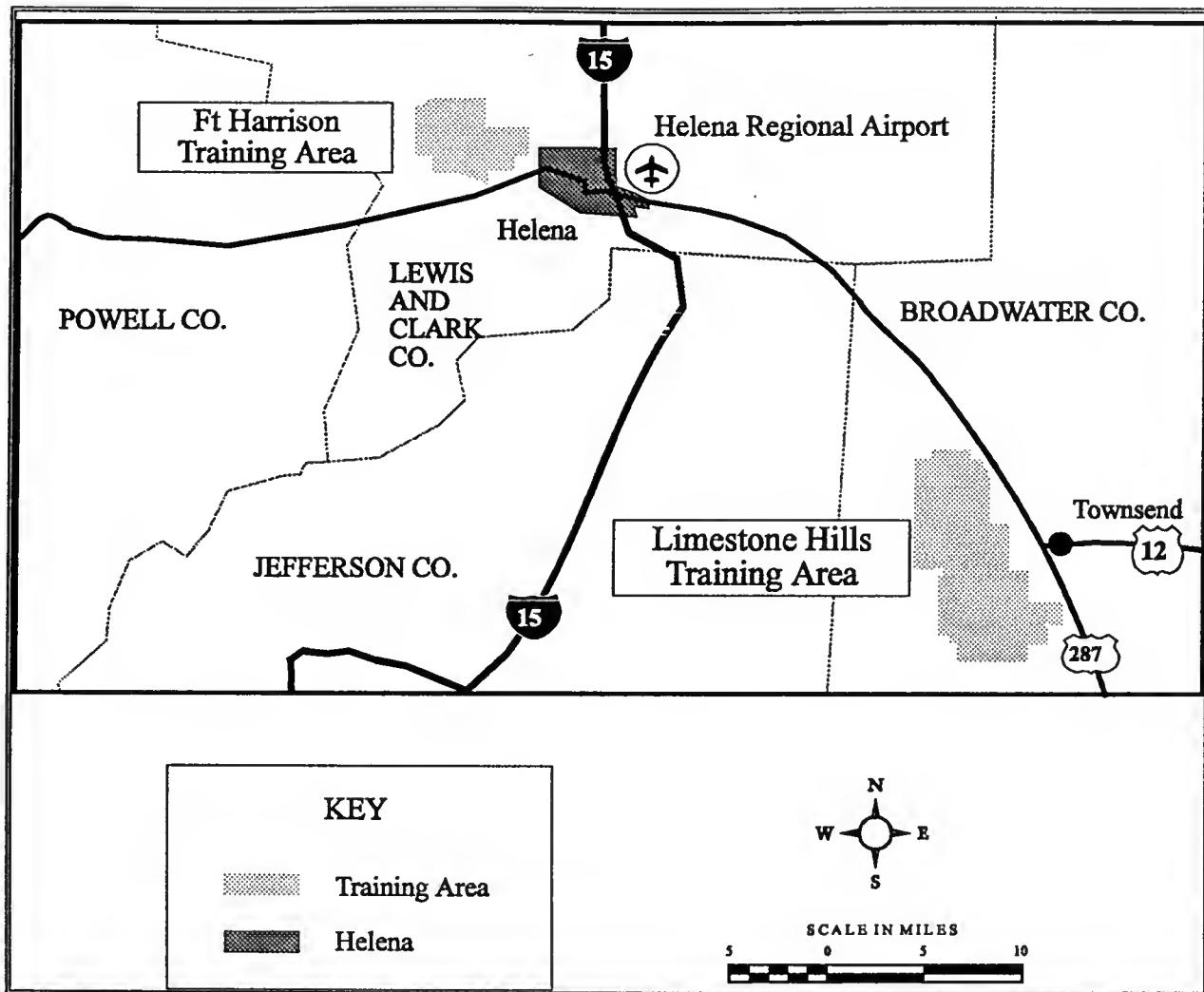


Figure 2.5-1 Limestone Hills Training Area

2.6 REASONABLY FORESEEABLE CUMULATIVE ACTIONS

The Fort Harrison Master Plan (January, 1996) identifies the continued development of the Fort Harrison cantonment area over the next 10 years. Construction planned at Fort Harrison (not within the proposed acquisition parcel) includes a training site battalion support complex and an armed forces reserve center. Construction of a combat pistol course is also being planned. The Master Plan also provides for ammunition igloos (to replace those that are not currently in compliance), bachelor officer quarters/bachelor enlisted quarters, a regional simulation center, additional latrines, a laundry facility, and a battalion maintenance shelter.

2.7 SUMMARY OF POTENTIAL IMPACTS

Areas of environmental and socioeconomic concern have been identified through the IICEP process, from discussions with Federal and state agencies, local authorities, MT ARNG personnel, and from comparisons with similar Department of Defense activities. Table 2.7-1 summarizes the potential impacts to the public and environment from implementing the Proposed Action, Partial Acquisition Alternative (Alternative Action), or No Action Alternative at Fort Harrison. For some resource elements, no impact would occur. The intensity of an impact is referred to as either significant or insignificant. The criteria to define the degree of impacts are unique to each environmental resource and are discussed in Chapter 4 within each resource section.

Table 2.7-1
Summary of Potential Impacts

Activity / Resource Area	Proposed Action	Alternative Action	No Action
Operations and Safety			
•Aircraft Operations	No impact	No Impact	No impact
•Range and Training Operations	No impact	No impact with continued lease; Significant impact if land is developed	No Impact with continued lease; Significant impact if land is developed
•Safety	Beneficial Impact	Beneficial Impact with continued lease; Insignificant Impact if land is developed	No impact with continued lease; Insignificant Impact if land is developed
Air Resources			
•Air Quality	No impact	No Impact with continued lease; Insignificant Impact if land is developed	No Impact with continued lease; Insignificant impact if land is developed
Geological Resources			
•Geology/Physiography, Seismicity	No impact	No Impact	No impact
•Soils, Minerals	Insignificant Impact	Insignificant impact with continued lease; Potentially significant impact if land is developed	Insignificant impact with continued lease; Potentially significant impact if land is developed
Water Resources			
•Groundwater, Surface Water, Water Quality	No impact	No impact with continued lease; Insignificant Impact if land is developed	No impact with continued lease; Insignificant Impact if land is developed

Table 2.7-1
Summary of Potential Impacts

Activity / Resource Area	Proposed Action	Alternative Action	No Action
Biological Resources			
•Vegetation, Noxious Weeds, Wildlife	Insignificant Impact	Insignificant impact	Insignificant impact
•Sensitive, Threatened, or Endangered Species	No Impact	No impact	No impact
•Wetlands	No impact	Insignificant impact with continued lease; Potentially significant impact if land is developed	Insignificant impact with continued lease; Potentially significant impact if land is developed
Cultural Resources			
•Cultural Resources	Insignificant impact	Insignificant impact	Insignificant impact
Noise			
•Noise	No impact	No impact with continued lease; Insignificant impact if land is developed	No impact with continued lease; Potentially significant impact if land is developed
Socioeconomics			
•Socioeconomic Resources	Insignificantly beneficial impact	Insignificantly beneficial impact with continued lease; Insignificant impact if land is developed	No impact with continued lease; Insignificant impact if land is developed
Land Use			
•Land Use	Insignificant impact	Insignificant impact	Insignificant impact
Environmental Programs			
•Hazardous Materials, Hazardous Waste, IRP, Solid Waste, Wastewater	Insignificant impact	Insignificant impact	Insignificant impact

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CHAPTER 3
AFFECTED ENVIRONMENT

3 **AFFECTED ENVIRONMENT**

This chapter describes the human environment at Fort Harrison and the acquisition parcel, providing baseline information to allow the evaluation of potential environmental impacts that could result from the Proposed Action, Alternative Action, and No Action Alternative. As stated in 40 CFR §1508.14, the human environment includes natural and physical resources and the relationship of people to those resources. The environmental baseline or resource areas described in this chapter were selected after identifying the potential issues and concerns of the Proposed Action and alternatives. Only relevant resource areas are described; resource areas that would not be impacted are not described in this chapter nor evaluated in Chapter 4. For example, visual resources would not be impacted because the Proposed Action does not include any construction or development on the acquisition parcel.

The resource areas that may be impacted by the Proposed Action or alternatives include operations and safety, air resources, geological resources, water resources, biological resources, cultural resources, noise, socioeconomic, land use, and environmental programs.

The order of resource description is based on introducing the physical environment (air, geology, and water), the natural environment (biology), the human environment (operations and safety, cultural, noise and land use, and socioeconomic), and concludes with the environmental framework (environmental programs) that manages the aforementioned resources.

3.1 OPERATIONS AND SAFETY

The Fort Harrison complex provides various military training opportunities for numerous Federal and state agencies. The following subsections discuss operations occurring at Fort Harrison and the AASF located at Helena Regional Airport. Those operations occurring within the proposed acquisition parcel are identified.

3.1.1 Current Operations

Operations within Fort Harrison include helicopter training, use of military firing ranges, and activities of various operational specialty qualification schools; this training occurs on Fort Harrison, but not necessarily on areas within the acquisition parcel. In addition to the use of the Fort Harrison training area, helicopter operations may originate from the AASF and continue to Limestone Hills, Lone Mountain, Twin Bridges, and Sieben training areas. Gunnery training also occurs at Limestone Hills. This EA focuses on activities occurring in the Fort Harrison complex. Consequently, no further discussion of operations at the other areas is presented.

3.1.1.1 Helicopter Training

The Fort Harrison training area has been used by the MT ARNG for low-level (below 500 feet) flight and other related training activities since 1960. Nap-of-the-earth flying may occur in the Fort Harrison training area (MT ARNG, 1995). Training of this type involves flight at varying airspeeds as close to the earth's surface as vegetation, obstacles, and ambient light will allow, while generally following the contours of the earth. Helicopters practice "touch and go"

operations, hovering, and sling loading on a landing strip at Fort Harrison (not within the proposed acquisition area).

The actual hours of helicopter flight time at Fort Harrison are not tracked. Three types of helicopters are flown by the MT ARNG: the Black Hawk (UH-60), Huey (UH-1), and Kiowa (OH-58). There are 3 Black Hawks (projected to receive 5 more), 23 Hueys, and 3 Kiowas stationed at the AASF (Rahn, 1996). The number of aircraft using the Fort Harrison training area typically varies from 2 to 8 aircraft during normal weekday operations. During drill weekends (3 or 4 weekends per month), up to 12 helicopters may be flown in the training area. Rarely are more than 6 helicopters present in the area at one time. The normal flight duration is 1.5 to 2 hours (Rahn, 1996).

Night operations in the summer occur generally after 9:00 to 10:00 pm, while night operations in the winter occur generally after 6:00 pm. The MT ARNG generates 10,800 operations per year at the Helena Regional Airport. The MT ARNG pilots fly approximately 96 hours per year per pilot. The majority of the flying operations are in the Hueys and Black Hawks (MT ARNG, 1995).

The AASF at the Helena Regional Airport only supports unit and intermediate level maintenance. Unit-level maintenance might involve changing an engine, while intermediate level might involve some engine disassembly to perform repairs. No depot level maintenance such as disassembling a complicated fuel control mechanism or avionics component occurs at the AASF. Depot level maintenance is performed at the Aviation Classification Repair Activity Depot in Fresno, California.

3.1.1.2 Military Firing Ranges

The following firing ranges are within Fort Harrison but not located on the proposed acquisition property. The safety fans for the M16 and M60 ranges comprise almost the entire proposed acquisition area (see Figure 3.1-1). The following ranges are used by 8 to 12 soldiers at once, typically on weekends only.

Pistol range: Handguns used on this range are .45 caliber and 9mm. There are two different types of ranges (combat and qualification); both use live ammunition. The combat range has targets that pop up, and a soldier has to shoot within a certain amount of time after the target pops up. The qualification range has stationary targets that a soldier shoots at for a score. The soldiers must attain certain scores to qualify on this range.

M16 zero range: Soldiers use this range to sight and fire live ammunition from the 5.56mm rifle. Sighting a weapon means practicing to find out where a soldier aims versus where the ammunition hits the target.

M16 qualification range: The 5.56mm rifle with live ammunition is used by soldiers on this range. This range has pop up targets at distances from 50 to 300 meters. The soldiers have to hit a certain number of targets to qualify on this range. Soldiers must qualify once a year on this range.

M60 range: The 7.62mm rifle is used with live ammunition for qualification and familiarization. Human-form plastic targets are used on this range.

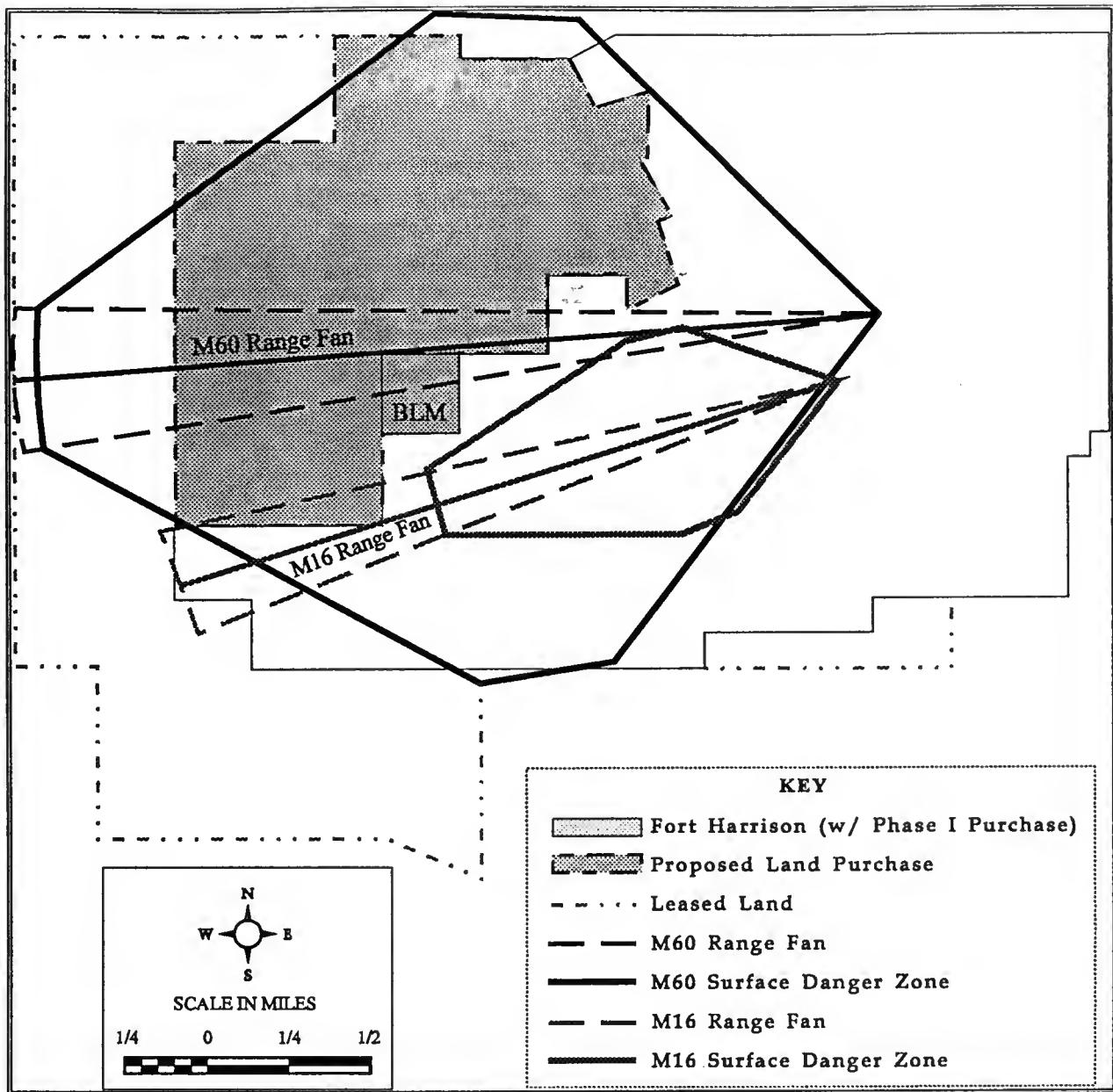


Figure 3.1-1 Range Fans and Surface Danger Zones at Fort Harrison

M203 range: This is a grenade launcher range used by the soldiers to practice firing practice grenades from an M203 grenade launcher. This range is used for both familiarization and qualification.

M72 range: This range is used by soldiers to practice firing sub-caliber shoulder-fired rockets. No live ammunition is used; hard targets and plywood targets are used.

The Operations and Training section has established new procedures for use of the training ranges to allow recording of data pertaining to the type of use, length of use, quantity of ammunition

used, and other information. The data will be input into a computer program, Range Facility Management Support System, to allow rapid preparation of usage reports.

3.1.1.3 Military Operational Specialty Qualification (MOSQ) Schools

Fort Harrison provides classrooms, training areas, and quarters for the Montana Regional Training Institute (MTRTI) for conducting weekend and annual training for Officer Candidate Training and Noncommissioned Officer courses. The MTRTI coordinates all MOSQ schools, and provides classroom and training support to several other agencies. Fort Harrison presently supports training for Army National Guard, Army Reserve, and Active Army, various special forces groups (e.g. Navy Sea, Air, and Land (SEAL) teams, Navy Sea Bees), Air Force Security Police, and Air Force Communications groups, plus local, state, and Federal law enforcement agencies. In total, 30 different courses are offered at Fort Harrison, involving about 1,200 personnel during the year. These classrooms are located within the Fort Harrison complex but are not within the proposed land acquisition property.

3.1.1.4 Dismounted Infantry Training

Dismounted training is generally conducted once per month during the summer, with up to company-size units (120 personnel). Maneuvers are limited to foot traffic, and support vehicles are restricted to existing roads. This training does occur within the acquisition parcel, in addition to other locations within the Fort Harrison training area. Soldiers dismount from the M1 tank or M2A2 Bradley Infantry Fighting Vehicle, which are used only on existing roads, and enter into the training area. Typically, two platoons (60 soldiers) break up into squad formations of 7 to 8 soldiers and traverse various terrain within Fort Harrison. They may traverse with an objective of encountering an enemy, or they may just practice foot maneuvers. Soldiers may carry a rubber version of the M16 or other disabled weapons. No live ammunition is used during infantry training.

3.1.1.5 Land Navigation Course

The land navigation course is used by platoon-size units (30 personnel). Personnel use the course for foot traffic only. This course is used approximately 35 to 40 times per year. This training does occur within the acquisition parcel as well as other locations on the Fort Harrison training area. The purpose of this course is for soldiers to train and practice moving from one point to another. On the land navigation course, soldiers are given a starting point and then given anywhere from 3 to 20 additional points that they must find. For example, at the starting point they would be told to go to point 1, which is 300 meters to the north, and then from that point go to point 2, which is 500 meters to the west. This is typically done on an individual basis but is sometimes done using the "buddy" system, which involves two soldiers. Depending on the number of points a soldier must find, this training may last 30 minutes or 8 hours. This training is usually done during the day but occasionally occurs after dark.

3.1.1.6 Thermal Targets for M1 Tank Lane Training

Tank silhouettes made of plywood and fitted with insulated electric heat coils are positioned at known distances from a tank course. The M1s have a sighting system that allows them to see in the dark. M1 tank crews practice acquiring these targets during routine training. They practice getting their sights on the target and are timed on finding and sighting the target. No rounds are fired at these targets. Tanks are restricted to existing roads and parking lots during training. This training does not take place within the acquisition parcel but does occur within Fort Harrison.

3.1.1.7 Bivouac Area

During summer months, the area west of Fort Harrison near the M60 range is used as a troop bivouac (camping) area. This area is used for platoon and company-size operations for about 10 to 15 days. This training does not currently occur within the area proposed for acquisition; however, it is possible this training could expand into the proposed acquisition property in the future. The area typically supports tents for a squad, company, or battalion. Occasionally, a generator is used to supply electricity for lights.

3.1.1.8 Special Operations Training

The landing strip at Fort Harrison (known as the Marshall Drop Zone) is used during special operations training. During this training, C-141 and C-130 aircraft use this area for dropping 15 pound practice bundles. Personnel also parachute into this area. Special Operations forces from active military components conduct infiltration (insertion) and exfiltration (extraction) exercises from helicopters flying at low levels. The landing strip is not located within the acquisition parcel.

3.1.2 Safety

3.1.2.1 Helicopter Flight Safety

To ensure the safety of personnel and the public, and to avoid loss of property around installations, the Army implements safety considerations in all areas of flying operations. The Army conducts a comprehensive flight safety program to ensure the airworthiness of each aircraft, the proficiency of the aircrews, and the safety of airborne operations. Also, training flights are routed over sparsely populated areas whenever possible.

The Army classifies mishaps into categories — Class A, Class B, Class C, and High Accident Potential, characterized as follows:

- **Class A:** a total cost in excess of \$1 million for injury, occupational illness, and property damage; a fatality or permanent total disability; or destruction or damage beyond economical repair to an Army aircraft.
- **Class B:** a total cost in excess of \$200,000 (but less than \$1 million) in property damage; permanent partial disability; or, hospitalization.
- **Class C:** damage in excess of \$10,000 (but less than \$200,000), or an injury or occupational illness which results in a loss of worker productivity greater than eight hours.

- **High Accident Potentials:** Mishaps not meeting the definitions of Classes A, B, or C, but which because of damage or injury necessitate Army reporting.

The U.S. Army Safety Center (USASC) at Fort Rucker, AL, maintains mishap data by aircraft type. Mishap data for the type of aircraft based at the AASF are shown in Table 3.1-1.

Table 3.1-1
Mishap Data by Aircraft Type

Aircraft	FY 86 - FY 95 Mishaps		Rate ¹	
	Class A	Class B	Class A	Class B
UH-1	67	20	1.20	0.36
OH-58	63	3	2.50	0.12
UH-60	33	24	1.91	1.39

¹Per 100,000 flying hours

Source: Gil, 1996

The danger of bird strikes in this area is negligible. There has not been a bird strike to any Army helicopter during a training flight in the Fort Harrison area within the last five years (Rahn, 1996).

3.1.2.2 Military Firing Range Safety

All training on the firing ranges is done in accordance with Army Regulation 385-63 (Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat) and Department of Military Affairs Regulation DMAMT 210-21 (Installations, Ranges, and Training Areas). These two regulations dictate the size and configuration of the firing ranges. Further, all weapons training at Fort Harrison is controlled by published procedures in a document titled "Training Area and Range Standard Operating Procedures (SOP)," which is published in the local range handbook (MT ARNG, 1995c). The primary purposes of the SOP are to provide instruction and procedures for the ranges, to ensure training and firing ranges are maintained in a good state of readiness, and to mandate safety procedures for the operation of the ranges. Each specific range and training area has general and specific procedures listed in the training range manual to ensure the safe and effective use of the area. From 1991 through 1996 there has not been any safety violations or accidents on any of the ranges in Fort Harrison. Additionally, no munitions expended on the firing ranges have fallen outside the safety zones for the firing ranges (Schaan, 1996).

3.1.2.3 Other Specialty Schools Safety

Other schools that use the training areas do not use live ammunition, and there has not been a significant vehicle accident in over four years (Schaan, 1996). Two minor vehicle incidents did occur within the last four years on the ranges: one involved an M113 personnel carrier that rolled over, and another involved a dump truck that rolled over. There were no injuries in either incident.

3.2 AIR RESOURCES

The air resources section describes the climatic and meteorological conditions that influence the quality of the air and existing concentrations of various pollutants. Precipitation, wind direction and speed (horizontal airflow), and atmospheric stability (vertical airflow) are factors that determine the extent of pollutant dispersion.

3.2.1 Climatology and Meteorology

Helena is located on the south side of an intermontane valley bounded on the west and south by the main chain of the Rocky Mountains. The valley is approximately 25 miles from east to west, and 35 miles from north to south. Helena is 4,157 feet above sea level; the average height of the mountains above the valley floor is 3,000 feet.

The Helena Valley has a semiarid climate that is typical of areas in Montana on the eastern side of the Continental Divide. Factors affecting the climate include invasions of maritime air masses from the Pacific Ocean and drainage of cool air into the valley from the surrounding mountains. The mountains to the north and east deflect shallow air masses of invading Arctic air to the east. Cold air can collect in the valley and be trapped by inversions for several days during the winter and early spring months. These inversions can be pronounced.

Summertime temperatures are moderate, with maximum daily readings generally under 90°F and daily minimums near 50°F. The extreme summer temperatures are 105°F and 18°F. Daily winter maximums are near 30°F and minimums are 10°F to 15°F. The lowest recorded temperature is -42°F.

Winds are generally westerly throughout the year, averaging 7 to 8 miles per hour (mph). Stronger winds are also westerly, with maximum gust speeds of 55 to 65 mph.

The average annual precipitation is 11.37 inches. Most of the precipitation falls from April through July as frequent showers and thundershowers. June is the wettest month of the year with an average of 2.01 inches. Snow can be expected from September through May, with an average accumulation of about 48 inches. Snowfall during November to April averages 5 to 8.5 inches per month. The average relative humidity is 57 percent (City of Helena, 1996).

3.2.2 Criteria Air Pollutants

Air quality is determined by comparing ambient air levels of criteria pollutants with National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (MAAQS). The NAAQS were established by the U.S. Environmental Protection Agency (USEPA) to define the allowable concentrations of six criteria air pollutants. These six criteria pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter with a diameter of 10 microns or less (PM_{10}), and lead (Pb). The NAAQS include maximum concentrations of pollutants that may be reached, but not exceeded, in a given time period. The standards are set to protect human health (primary standard) and welfare (secondary standard). The primary standards are set with a reasonable margin of safety to protect sensitive members of the population.

Criteria pollutants may directly or indirectly originate from diverse mobile and stationary sources. Most pollutants are generally emitted directly from a source, except for O₃. Most O₃ forms as a result of volatile organic compounds (VOC) and oxides of nitrogen (NO_x) reacting with sunlight in the atmosphere.

Areas not meeting ambient air quality standards are designated as nonattainment for the specific pollutant causing the violation. Standards are not to be exceeded more than once per year, except for O₃ and PM₁₀ standards, which are not to be exceeded more than an average of one day per year. For example, four days with an exceedance of the O₃ standard in three years or less is a violation. Both the primary NAAQS and the MAAQS are presented in Table 3-2.1.

Air quality at Fort Harrison and in the training areas is generally very good. Fort Harrison and the training areas are presently designated as being in attainment for all criteria pollutants by the USEPA and the state. However, an area near the Helena Airport is in non-attainment for lead and SO₂, as a result of smelting operations at the ASARCO plant in East Helena (Linconbock, 1996).

A combination of inversion strength and wind speed determine the ventilation or dilution factor for an area. Although ventilation in the area is normally adequate to disperse most pollution, ventilation decreases during cooler months, and carbon monoxide and particulates reach their highest levels in late fall and winter.

Criteria pollutants are quantified by the type of source. For example, aircraft and automobiles are mobile sources. Emissions from these sources are spread over wide areas. Point sources, however, are found at fixed locations. For example, power plants and fuel tanks are point sources. Air emissions inventories generally include specific point sources. Other types of studies, such as air conformity studies, also identify mobile sources.

Table 3.2-2 provides emissions inventories for criteria pollutants at MT ARNG locations. The actual and potential emission totals include motor vehicle emissions, but not helicopter emissions. Actual helicopter emissions are provided in a separate line. The potential emissions are the amount of air pollutants that could be released if all sources were emitting the maximum amount of emissions.

As shown in Table 3.2-2, Fort Harrison and the training areas do not produce substantial amounts of criteria pollutants. The primary source of MT ARNG criteria pollutants are helicopters, which operate out of the Helena Regional Airport. Emissions from the helicopters are dispersed over a 100-mile radius area around Helena, where the helicopters are flown, including the training areas. Other mobile sources of criteria pollutants include aerospace ground equipment, and employee and government vehicles. Stationary sources of criteria pollutants include helicopter and vehicle maintenance activities, heat plant emissions, and refueling operations.

Table 3.2-1

Pollutant	Averaging Time	NAAQS		MAAQS
		mg/m ³	ppm	
O ₃	1 hr	235	0.12	.01 ppm
CO	1 hr	40,000	35	23 ppm
	8 hr	10,000	9	9 ppm
NO ₂	1 hr	---	---	.03 ppm
	AAM	100	0.05	.05 ppm
SO ₂	24 hr	365	0.14	.05 ppm
	Annual	80	---	.01 ppm
PM ₁₀	24 hr	150	---	150 mg/m ³
	AGM	---	---	50 mg/m ³
Pb	90 day	1.5	---	1.5 mg/m ³
	1 month	---	---	---

Table 3.2-2
Actual and Potential Air Emissions (tpy)

Actual and Potential Air Emissions (tpy)						
Pollutant	PM ₁₀	SO ₂	NO _x	CO	VOCs	Lead
Actual Emissions - Fort Harrison ^a	0.13	0.13	1.08	0.38	0.47	2.64e-05
Actual Emissions - AASF ^a	0.03	0.05	0.29	0.06	0.27	1.03e-05
Potential Emissions - Fort Harrison ^a	1.79	0.09	15.00	4.63	7.47	3.69e-05
Potential Emissions - AASF ^a	0.47	0.10	3.90	0.84	0.61	1.54e-05
Actual Emissions -AASF (helicopters) ^b	Neg	3.71	21.25	32.61	17.78	NA

*Lead emissions are abbreviated; e.g., 2.64e-05 is equal to 0.0000264 tpy.

All lead and most SO₂ emissions are from waste oil burners.

Most VOC emissions are from fuel storage and transfer operations.

Most PM10, NOx, and CO emissions are from heating operations.

^bCalculations are based on existing flight hours.

Neg = negligible

VOC emissions include only hydrocarbons

NA = not applicable

Sources: MT ARNG, 1996e; MT ARNG, 1995

3.2.3 Ozone Depleting Substances

Ozone depleting substances (ODS) are compounds (e.g., freon) that may cause or contribute to degradation of the earth's stratospheric ozone layer. Stratospheric ozone protects health by screening unwanted ultraviolet emissions from the sun. Stratospheric ozone should not be confused with tropospheric, or ground-level, ozone (which is regulated by the NAAQS standard and can be harmful to human health). ODSs are listed under Section 602 of the Clean Air Act, which also specifies timeframes for the phase-out of ODSs. Although ODSs are being phased out, there are uses and supplies of ODSs. For example, some large fire extinguishers use ODS propellants.

3.2.4 Hazardous Air Pollutants

An extensive list of hazardous air pollutants (HAP) have been identified by the USEPA. HAPS are generated during numerous MT ARNG activities. Maintenance activities, for example, use a variety of cleaning, etching, or painting materials that contain volatile hazardous constituents, which are released to the atmosphere when the product is used. These products can represent a health hazard for base personnel and, especially, sensitive receptors located in the vicinity of the facility. HAPs may also impact the receptors in the natural environment (i.e., plants and animals). The MT ARNG is required to track the total amount of HAPs at their facilities under the reporting requirements of the Emergency Planning and Community Right-to-Know Act (EPCRA). The totals for Fort Harrison are 0.54 tons per year (tpy) (actual emissions) and 9.00 tpy (potential emissions). The AASF totals are 0.26 tpy (actual emissions) and 0.43 tpy (potential emissions) (MT ARNG, 1996e).

3.2.5 Prevention of Significant Deterioration

Air quality can affect visibility. Certain areas are designated as prevention of significant deterioration (PSD) areas. Class I PSD areas, where visibility is an important value, are considered when a Federal action may affect air quality. The nearest PSD Class I area to Fort Harrison is Gates of the Mountains Wilderness Area, which is about 20 miles north of Helena. Another Class I area, the Anaconda-Pintler Wilderness Area, is about 75 miles southwest of Helena.

3.2.6 Sensitive Receptors

Sensitive receptors are populations that are more susceptible to the effects of air pollution than is the general population. Sensitive receptors include populations found at facilities such as long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, public schools, playgrounds, child care centers, and athletic facilities. Receptors near localized sources of toxics and carbon monoxide are of particular concern. The nearest residence to the properties to be acquired is about 0.5 miles away. The Veterans Administration Hospital, another sensitive receptor, is located in the center of the eastern portion of Fort Harrison, about 0.5 miles from the site. No other sensitive receptor is found in the immediate vicinity (at or within a quarter mile) of the property to be acquired (MT ARNG, 1995d).

There are no sensitive receptors at or within a quarter mile of the Helena Airport. There are some sensitive receptors, a convalescent home, schools, and Saint Peter's Hospital, located approximately one mile from the airport boundary (Ferguson, 1993).

3.3 GEOLOGICAL RESOURCES

Geological resources include the physical surface and subsurface features of the Earth such as the physiography, geology, soils, and the seismic nature of an area.

3.3.1 Physiography/Geology

Fort Harrison is located on the edge of the Helena Valley, a northwest-trending oval-shaped basin covering about 875 square miles. The valley is bounded on the west by the Scratchgravel Hills, on the southwest by the main range of the Rocky Mountains, on the south by the Elkhorn Mountains and Boulder batholith, the Big Belt Mountains to the north, and the Spokane Bench to the east (see Figure 3.3-1). The western part of the valley is gently sloping, while the eastern portion of the valley consists of low rolling hills.

Mount Helena, on the southern edge of the city of Helena, rises to approximately 5,460 feet. Elevations at Fort Harrison range from 3,950 feet in the southeast to 4,818 feet near the southwest corner. Elevations within the proposed purchase area range from 4,160 feet along the east edge to 5,252 feet near the west edge. The land generally slopes downward toward the northeast. Several intermittent streams (tributaries of Cherry Creek and Blue Cloud Creek) have carved small valleys throughout the site.

Stream deposits (Quaternary alluvium) underlie the northeast corner of Fort Harrison (see Figure 3.3-2). These water-bearing sediments, comprised of pebbles, cobbles, and boulders interlayered with thin beds and lenses of sand, silt, and clay, are generally 10 to 40 feet thick.

Slope wash deposits (Quaternary alluvium) approximately 1 to 20 feet thick, underlie the northern half of Fort Harrison and the eastern part of the proposed acquisition parcel. Slope wash is comprised of soil and rock material deposited on slopes by the action of gravity and by surface water runoff not concentrated into stream channels. These deposits consist of beds of coarse gravel interlaid with thin irregular beds and lenses of silt and clay. The gravel, in a matrix of sandy and silty clay, is composed of fragments of quartzite, shale, and limestone (USGS, 1986).

Sedimentary bedrock, consisting of sandstone, shale, limestone, and dolomite, underlies much of the southern half of Fort Harrison and most of the proposed acquisition parcel. This bedrock also underlies the slope wash and stream deposits. This layer is several thousand feet thick. These rocks are inclined at moderate to steep angles as a consequence of the bending and tilting of the rocks by forces that formed the Rocky Mountains. The sedimentary bedrock ranges from middle Late Cretaceous age (about 86 million years ago) to Middle Proterozoic age (about 1,600 million years ago).

Plutonic bedrock underlies southeastern Fort Harrison and scattered areas throughout the rest of the Fort and the proposed acquisition area. Deep erosion has exposed most of the plutons at the surface. These rocks, mostly granite but some diorite and gabbro, range from early Tertiary age (45 million years ago) to Late Cretaceous age (about 78 million years ago) (USGS, 1986).

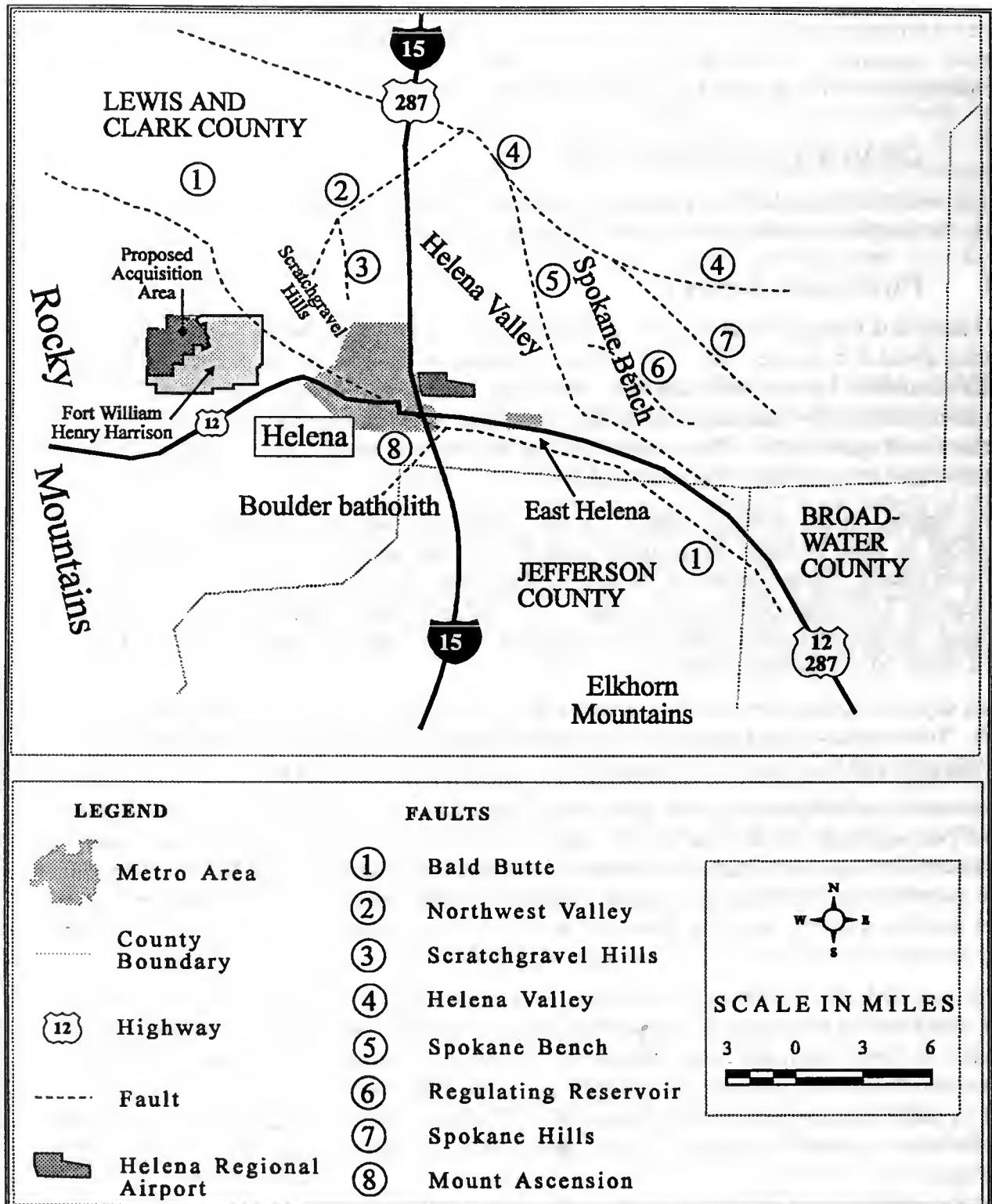


Figure 3.3-1 Physiography and Seismic Features of the Fort Harrison Vicinity

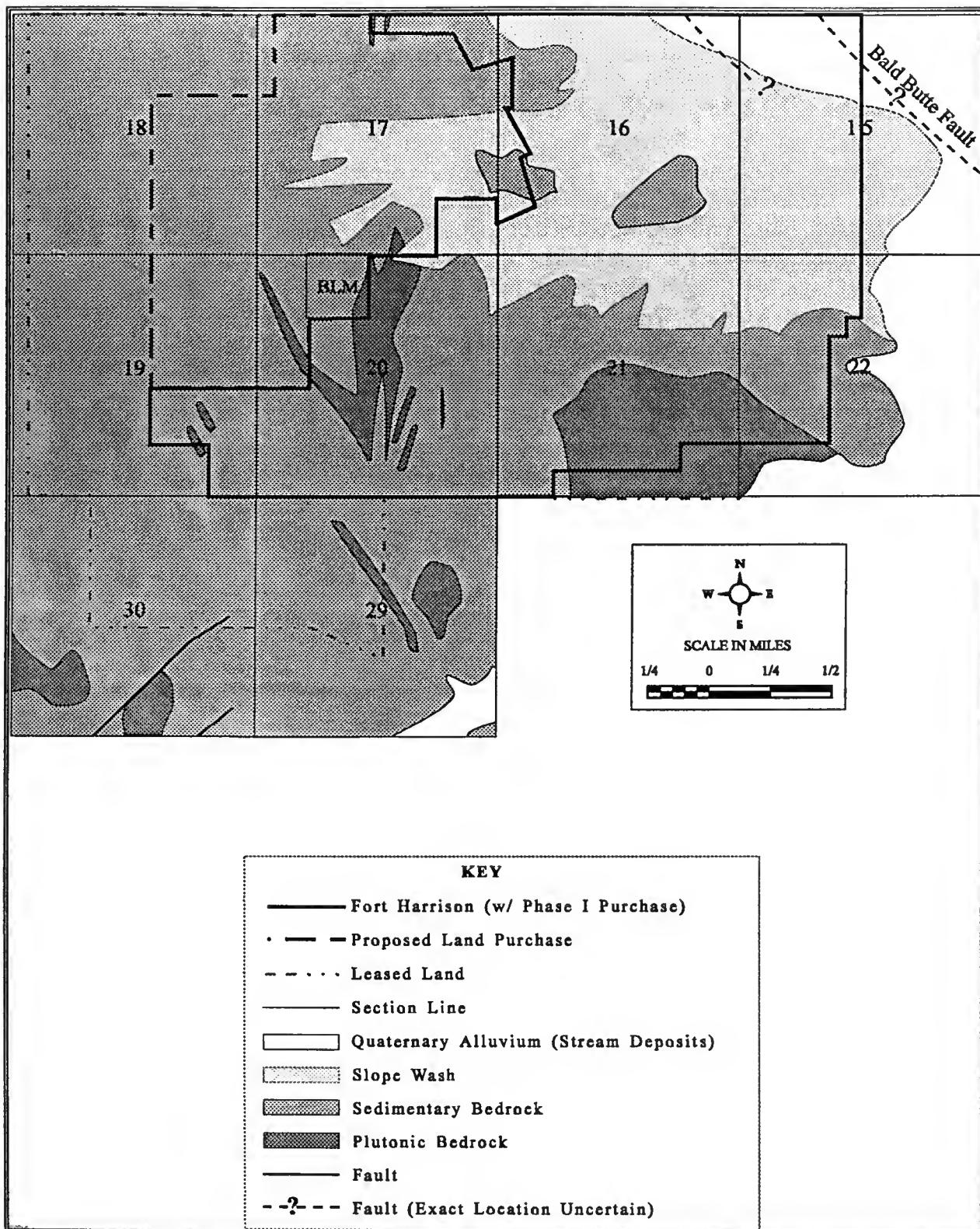


Figure 3.3-2 Geology of Fort Harrison Vicinity

3.3.2 Soils

Soils in the Helena area formed in alluvial terraces or fans in deposits of primarily sands and gravels or weathered directly from rocky material. The pattern of soils in the vicinity of Fort Harrison is complex because of differing parent material (bedrock and various types of deposits), erosion and drainage patterns, and slopes. Ten soils have been identified at Fort Harrison. These include Torrifluvents, Musselshell-Crago Complex, Roto-Pensore-Crago Complex, Geohrock-Tolman-Channery loam, Thess loam, Crago-Musselshell Complex, Hauz-Tolman Channery loam, Chinook Sandy loam, Fluaquents and Aquolls, and Sappington-Musselshell Gravelly loam. Four soils have been identified within the proposed acquisition area; these include the Musselshell-Crago complex, Crago-Musselshell Complex, Hauz-Tolman Channery loam, and Musselshell-Roto-Pensore Complex.

Slopes are between 0 and 8 percent for most of the soils. Slopes in the Crago-Musselshell Complex, Geohrock-Tolman-Channery loams, and the Hauz-Tolman Channery loams range from 4 to 35 percent. The Roto-Pensore Crago Complex contains slopes from 15 to 45 percent. These soils have a surface layer of loam extending to a depth of about 4 inches. Gravelly loams, sandy loams, or very gravelly loams extend to a depth of 40 to 60 inches.

All of the aforementioned soils have a moderately low runoff potential. The permeability is moderate (from 0.6 to 2.0 inches per hour) to a depth of about 20 inches, and moderately rapid (2.0 to 6.0 inches per hour) at greater depths (generally 20 to 30 inches). The depth to the water table is greater than 60 inches. The rate of water transmission throughout the soil is moderate. The shrink-swell potential (the change in volume from dry to wet conditions) is low. The hazard of wind erosion is slight. The hazard of water erosion ranges from slight where the slopes are gentle to moderate where the slopes are steeper (predominately in the western portions of the proposed acquisition parcel). No visible areas of erosion are evident.

3.3.3 Minerals

The plutonic rocks in the vicinity of Fort Harrison have been mineralized and contain veins of gold. Erosion of these rocks have released gold to alluvium of modern drainages (USGS, 1994). Gold has been mined in the vicinity of Helena. There are several dozen prospects within the proposed acquisition area, including 8 mine shafts. Appendix C, extracts from a cultural resources survey of the proposed acquisition parcel, includes a discussion of these prospects.

Scattered coal deposits are located about 10 miles to the west of Fort Harrison. These deposits are not commercially mined (USGS, 1994; Porter, 1996).

No gravel or fill operations were identified within a mile of Fort Harrison (USGS, 1985; USDA, undated).

3.3.4 Seismicity

The Lewis and Clark Line, a 10 to 50 kilometer (6 to 30 mile) wide zone of faulting, separates an area of sedimentary, volcanic, and plutonic bedrock south and west of the Helena Valley from an area of sedimentary deposits in and north of the Helena Valley. The Bald Butte Fault, forming the southern boundary of the line, runs through the northeast corner of Fort Harrison (see Figure 3.3-2). An unnamed branch of the Bald Butte Fault runs through the north central portion of Fort Harrison. Other unnamed faults are located from $\frac{1}{2}$ to 2 miles southwest and west of the proposed acquisition area.

The Bald Butte Fault was the locus of many small earthquakes in 1973 and is believed to be the most seismically active fracture in the area. Vertical displacement along the fault varies from less than 200 meters (approximately 650 feet) to more than 4,400 meters (14,400 feet). Recent movement of the fault is believed to be horizontal rather than vertical (USGS, 1986).

Several hundred earthquakes have been felt in the Helena area since it was settled in 1864. Most of the earthquakes have been of weak to moderate intensity (II to IV on the Modified Mercalli Scale, or 1.6 to 3.5 on the Richter Scale). These earthquakes are capable of causing only minor damage. In October, 1935, a strong earthquake struck Helena (the epicenter was about 10 miles northeast of the city center) with an intensity of VIII on the Modified Mercalli Scale (6.2 on the Richter Scale). The earthquake and aftershocks caused four deaths, about 50 injuries, and about \$4 million in property damage. Approximately 300 buildings sustained serious damage from this event. Several other powerful earthquakes (6.2 to 7.1 on the Richter Scale) occurred in the region between 1925 and 1959 causing minor damage in Helena.

Helena lies in Zone 3 on the seismic zonation map in the Uniform Building Code (International Conference of Building Officials, 1991), with ground motion of 38 percent of gravity. In this zone, earthquakes with a Modified Mercalli intensity of VIII or greater (5.5 or higher on the Richter Scale) are anticipated. Major damage would occur in poorly built or designed structures, while only slight damage would occur in buildings designed for seismic zone 3. Primary earthquake effects include ground motion and surface faulting—a rupture caused by different velocities of movement on either side of a break in the ground. Secondary effects from earthquakes include landslides and liquefaction—the process of changing soil and unconsolidated sediments into a watery mixture following an earthquake, especially in areas of saturated sediments. Areas underlain by unconsolidated sediments, such as the slope wash, are more susceptible to both primary and secondary earthquake effects than areas underlain by bedrock, due to amplification of ground motion in unconsolidated surficial materials and, possibly, a longer duration of shaking in these materials. The earthquake record in the area is much too short to identify or predict any cyclic recurrence of earthquakes. Activity at an intensity of I to V (Richter Scale magnitude of 1.0 to 4.1) is almost certain to continue. The possibility exists that an earthquake of intensity VI or greater (Richter Scale magnitude of 4.1 and greater) might occur at any time (USGS, 1986).

3.4 WATER RESOURCES

This section describes surface waters and groundwater at the MT ARNG properties, including the proposed acquisition parcel. Wetlands are described in Section 3.5.4, Biological Resources. Natural and human-induced factors determine the quality and quantity of water resources, and are described as relevant to this study.

3.4.1 Groundwater

Fort Harrison lies on the western edge of a valley that is bounded by the Elkhorn Mountains and the Boulder batholith to the south, the Scratchgravel Hills to the west, the Big Belt Mountains to the north, and the Spokane Bench to the east. Groundwater flow in the area is generally eastward, flowing from the western margins of the valley toward Lake Helena.

The Helena Valley-Fill Aquifer System (HVFAS) underlies the northeast part of Fort Harrison, as well as most of the valley. This aquifer system includes an area of about 60 square miles. The valley is filled to a depth of approximately 6,000 feet with fine- and coarse-grained sediments, overlain with about 100 feet of alluvium. The upper few hundred feet of valley fill is composed of complexly stratified lenses of cobbles, gravel, sand, silt, and clay. Lateral discontinuity of fine-grained layers allows hydraulic interconnection of water-yielding zones, which function as one complex aquifer. Aquifer recharge is through infiltration of streamflow, leakage from irrigation canals, infiltration of excess irrigation water, and inflow from fractures in bedrock. Discharge is through leakage to streams and drains, upward leakage to Lake Helena, and withdrawals from wells. This aquifer system is a major source of domestic water for local residents; most domestic water wells are less than 70 feet deep (USGS, 1992).

The existing training areas and proposed acquisition area are underlain by sedimentary bedrock, and have interspersed plutons throughout these areas. Water from these areas drains to the east and into the HVFAS. Several springs are located just north and east of the proposed acquisition area in Section 17, T10N, R4W. One intermittently wet seep is located in the proposed acquisition parcel about one-half mile south of Stemwinder Hill (Martinka, 1996).

3.4.2 Surface Water

Regional surface waters include the Missouri River, Lake Helena and four principal streams that flow into the valley. Streams in the vicinity of Fort Harrison flow to the east. The closest principal stream is Tenmile Creek, which is located to the south of the training areas. Blue Cloud Creek, located west and just south of the proposed acquisition area, flows into Tenmile Creek. Cherry Creek, which is located north of the proposed acquisition area, flows through Fort Harrison and into Tenmile Creek. Several smaller ephemeral streams also flow through the proposed acquisition parcel and into Fort Harrison. The area receives little precipitation and there is seldom any runoff through the drainages and ephemeral streams (Martinka, 1996). These streams are shown in the topographic map provided in Figure 3.4-1.

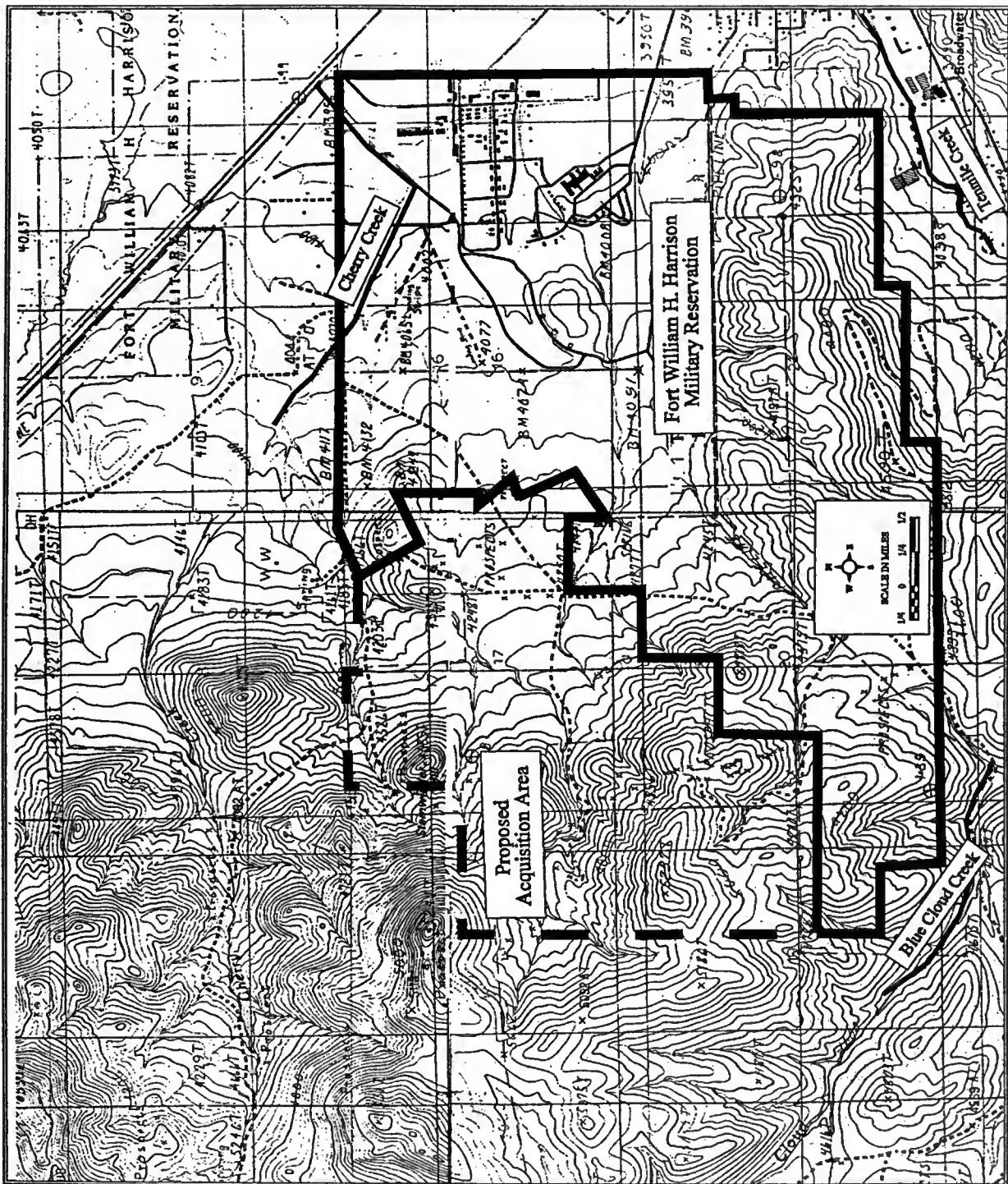


Figure 3.4-1 Water Features of Fort Harrison Vicinity

3.4.3 Water Quality

Analysis of groundwater samples indicate that water in wells completed in the HVFAS generally is a calcium bicarbonate type. Dissolved solids concentrations averaged 286 milligrams per liter (mg/L), which indicates hard water. Valley well water samples average a sodium-adsorption ratio value of 5 or less, which indicates water with sodium levels suitable for irrigation. The median nitrate concentrations were 1.1 mg/L, whereas USEPA primary maximum contaminant level (MCL) for nitrates is 10 mg/L. VOCs, which may have resulted from equipment contamination during sampling and analysis, were found in some wells in very small concentrations (0.6 to 4.1 micrograms per liter (mg/L)). Pesticides were detected in only one sample in a very low concentration (0.44 mg/L of 2,4-D). In general, groundwater quality from the valley aquifer system is good (USGS, 1992).

Surface water quality in the area is not monitored on a regular basis, and unprocessed surface water is not used in the area except for irrigation. Drinking water at Fort Harrison is supplied by the city of Helena.

3.5 BIOLOGICAL RESOURCES

Biological resources include the native and introduced plants and animals and the aquatic habitat in the region around Fort Harrison. This biological resources section is separated into four areas for discussion: vegetation; wildlife; sensitive, threatened, or endangered species; and wetlands. As part of the environmental assessment process, a biological survey was conducted for several days between May 6 to June 15, and from July 17-24, 1996 for the proposed acquisition parcel. The survey included a foot reconnaissance of the entire parcel as well as discussions with a wetland specialist from the Natural Resource Conservation Service and a botanist with the Montana Natural Heritage Program. The findings of this survey (see Appendix B) and additional baseline information are summarized in the following subsections.

3.5.1 Vegetation

Fort Harrison is located in the western foothills of the Rocky Mountain chain. The terrain is generally flat or moderately rolling on the eastern portion but on the western portion the terrain is dissected by gullies, ravines, and coulees. Fort Harrison consists primarily of grassland vegetation.

The most common grassland habitat found is bluebunch wheatgrass/western wheatgrass (*Agropyron spicatum/Agropyron smithii*). Other species commonly found include needle-and-thread (*Stipa comata*), prairie junegrass (*Koeleria cristata*), and Idaho fescue (*Festuca idahoensis*). The biological survey provides more detailed information on grassland habitats (see Appendix B).

Four conifer species were identified on the acquisition parcel during the biological survey. These were Douglas fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), ponderosa pine (*Pinus ponderosa*), and Rocky Mountain juniper (*Juniperus scopulorum*).

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3.5.2 Noxious Weeds

During scoping, a letter was sent to the Montana Department of Agriculture to request their input as to the potential for impacts from the Proposed Action. The agency response (see Appendix A) noted that noxious weeds threaten the biodiversity of the state and that the 1995 Montana Legislature recognized this and enacted HB 395 to address weed management plans on state-owned land. The letter noted that a plan should be developed in an effort between the MT ARNG and the county weed district. The MT ARNG recognizes the need for a noxious weed management plan and has taken initial steps to prepare a plan. This plan would be prepared under a separate effort and not within the Proposed Action of this EA.

The MT ARNG actively manages for noxious weed on all State and Federal lands used by the MT ARNG. Weed management is conducted annually with primary emphasis during the spring and summer months (typically late May through August). Fort Harrison currently has a local contract with a private company for aerial and ground spraying (truck application and some backpack spraying) of noxious weed. The numbers of acres sprayed each year varies; in 1996, 173 acres of Fort Harrison property were sprayed. The MT ARNG does not spray noxious weed in the proposed acquisition parcel; weed control in this area is the responsibility of individual landowners. The biological survey identified three species of noxious weed on the acquisition parcels. All three were found in limited numbers over small areas on the western side of the parcels. The three species identified were spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*), and dalmatian toadflax (*Linaria dalmatica*). Of these species, leafy spurge was the most common. This noxious weed was found in the upgradient portion of the wetland area. A mixture of Tordon 22k, 2,4-D Amine, and Transline is used to spray for noxious weeds on Fort Harrison.

3.5.3 Wildlife

Cattle owned by the RV Ranch graze over a portion of the Fort Harrison land, including the acquisition parcel. Wildlife in the vicinity consist of small mammals, rodents, and birds.

The biological survey found that elk are abundant in the area. Most signs of elk were from winter/spring use but some recent signs were also observed. The area serves as a winter range and as a travel corridor during certain months. Most elk use of the area occurs from December

through April; however, use is subject to local snow conditions (MT ARNG, 1995a). During most winters there are between 40 to 70 elk in the area (MT ARNG, 1996b).

An estimated 36 mule deer were observed on Fort Harrison during the May 1996 biological survey. All of the mule deer observed were in the western one-half of the acquisition parcel moving freely in and out of the forested areas to the west of Fort Harrison. No mule deer were observed in the lower elevations towards the eastern part of the acquisition parcel, and signs of the deer in this area were infrequent (MT ARNG, 1996b).

3.5.4 Sensitive, Threatened, or Endangered Species

The Endangered Species Act (ESA) requires that any action authorized by a Federal agency shall not jeopardize the continued existence of a threatened or endangered (T&E) species or result in the destruction or adverse modification of designated critical habitat of such species. A listed species, provided protection under the ESA, is so designated because of danger of its extinction. Previous information provided by the U.S. Fish and Wildlife Service indicates that no species listed or proposed for listing as threatened or endangered, other than migrant bald eagles, are likely to occur within Fort Harrison (MT ARNG, 1995). During reconnaissance for the biological survey, no sensitive, rare, or threatened plant species were found on the acquisition parcel, and no raptor nests were found in the area (MT ARNG, 1996b).

The Montana Natural Heritage Program database identified three species of special concern—the flammulated owl (*Otus flammeolus*), Westslope cutthroat trout (*Oncorhynchus clarki lewisi*), and gray wolf (*Canis lupus*)—within eight miles of Fort Harrison. Habitat for the flammulated owl is believed to be mature old-growth ponderosa pine forest with a Douglas fir understory (MT ARNG, 1996a). Nesting is in woodpecker holes or natural cavities. While Fort Harrison has not been surveyed for the flammulated owl, no habitat (old-growth pines) for the owl is known to exist. Cutthroat trout habitat is perennial streams or other bodies of water. Streams on Fort Harrison are intermittent (see Section 3.4.1) and do not provide habitat for the cutthroat trout. The gray wolf is federally listed as endangered. Wolves have been documented approximately 15 miles west of Fort Harrison. Several unconfirmed wolf sightings have been reported within 5 miles of Fort Harrison. No sightings have been reported within the immediate vicinity of Fort Harrison (MT ARNG, 1996b).

The bald eagle (*Haliaeetus leucocephalus*) has been a protected species in the United States since the establishment of the Bald Eagle Protection Act in 1940. Bald eagles are now listed as a threatened species. The bald eagle winters along major rivers and reservoirs and has been seen in the Helena area. The bald eagle is considered a migrant through this area (MT ARNG, 1995).

3.5.5 Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Interagency Committee for Wetland Delineation, 1989). Wetlands are diverse ecosystems that provide ecological benefits by supporting commercial fisheries, controlling floods, filtering wastes from water, and serving as recreation areas. They also provide habitat for many plant and animal

species, including economically valuable waterfowl and one-third of the nation's endangered species.

No wetlands are known to exist on Fort Harrison. A current biological survey (MT ARNG, 1996b) identified two areas in the proposed acquisition area that could be considered as wetland areas (see Appendix B). Site 1, located in the northwest quarter of Section 17, T10N, R4W, meets wetland criteria for soils and hydrology, but does not have the required 50 percent of facultative wetland or wetter vegetation. Site 2, located in the southwest quarter of Section 18, T10N, R4W, meets all three criteria needed to be designated as a wetland. The wetland includes all mature deciduous vegetation that surrounds the spring, and a portion of the drainage upstream (mapped and further described in Appendix B). The survey, although conducted by a wetland specialist from the Natural Resources Conservation Service, is not an official wetland determination.

3.6 CULTURAL RESOURCES

Cultural resources include archaeological and historical items, places, or events considered important to a culture, community, tradition, religion, or science. An example of a scientific resource would be paleontological evidence: physical remains, impressions, or traces of plants or animals from a former geological age. Archaeological and historic resources are locations where human activity measurably altered the earth or left deposits of physical or biological remains. Prehistoric examples include arrowheads, rock scatterings, village remains, whereas historic resources generally include campsites, roads, fences, homesteads, trails, and battlegrounds. Architectural examples of historic resources include bridges, buildings, canals, and other structures of historic or aesthetic value.

The Helena Valley was first occupied by white settlers in 1864. Cultural resources found in the valley include remnants of mining, agricultural, ranching, military, and transportation activities.

A Historical Preservation Plan (dated 1995) was completed for 48 facilities constructed during World War II at Fort Harrison. The purpose of the plan was to determine which of these facilities should be retained and preserved because of their historical value. Of the 48 structures surveyed, 15 were recommended for preservation and the remaining 33 were recommended for demolition (MT ARNG, 1996).

During scoping, a letter was sent to the Montana Historical Society to request their input as to the potential for impact to cultural resources. The agency response (see Appendix A) noted a list of recorded resources within the general project area. They recommended that a cultural resource inventory survey be conducted if ground-disturbing activities were planned for the acquisition parcel.

An Archaeological Phase I Survey was conducted for the acquisition parcel, and a report was prepared (MT ARNG, 1996d). The field work was accomplished from June 24-28, 1996. Selected portions of the report are reproduced in Appendix C. This survey commenced with a review of cultural resource files at the University of Montana, Department of Anthropology, Archaeological Records Office (Missoula), and the Montana State Historic Preservation Office in Helena.

Results of the field work for the Archaeological Phase I Survey recorded and evaluated five historic sites. No prehistoric sites were identified. The historic sites located are associated with 1880- to 1900-era mineral exploration and claims. These sites lack intact structures, association with important historic patterns, events, or persons, and have no subsurface components which could provide important information. There is little or no record of production for these claims. None of these sites are considered eligible for the National Register of Historic Places (NRHP) (MT ARNG, 1996d).

There were 71 historic isolated finds recorded during the Phase I Survey. Most of these isolated finds are prospect pits associated with mineral exploration. These finds lack specific temporal context, but may be from as early as 1880 to modern in age. Isolated finds are not eligible for the NRHP (MT ARNG, 1996d).

Two previously recorded sites on the acquisition parcel were located and reevaluated. One of the two sites, the Blackfeet Road, passes along the north edge of the parcel. This site is currently used as a county road and is not eligible for the NRHP. The second site was previously interpreted as a possible cavalry guard post associated with Fort Harrison. This interpretation was based on the presence of military issue dishware and silverware found at the site. The estimated occupation of this site is 1885; this precludes the possibility of Fort Harrison involvement since Fort Harrison was not established until 1895. It is likely that the prospects were visited by soldiers after 1895, because of its proximity to the fort, and that the military dishware found there is a result of this association. No record of a military facility was found at this location. This site is not eligible for the NRHP (MT ARNG, 1996c). These two sites were not considered eligible for the NRHP because they lack intact structures, association with important historic patterns, events, or persons, and have no subsurface components that could provide important information.

3.7 NOISE

Sounds which disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient, and intermittent or continuous.

3.7.1 Noise Descriptors

Community response to noise is based on a subjective assessment of the daily noise environment. Factors that affect this subjective assessment include the noise levels of individual events, the number of events per day, and the time of day at which the events occur. Most environmental descriptors of noise are based on these three factors, although they may differ considerably in the manner in which the factors are taken into account.

The decibel (Db) is the physical unit commonly used to describe sound levels. Sound measurement is further refined by using an "A-weighted" decibel (dBA) scale which emphasizes the audio frequency response curve audible to the human ear. Thus, the dBA measurement more closely describes how a person perceives sound. Figure 3.7-1 provides a range of sound level values in dBA for common sounds and for typical environments.

Scientific studies and social surveys that have been conducted to appraise community annoyance to all types of environmental noise have found the day-night average sound level (L_{dn}) descriptor to be the best measure of annoyance. The L_{dn} describes the 24-hour or daily noise environment. To compute an L_{dn} , single noise events are measured using an A-weighted scale with corrections added for the number of events and the time of day. A 10-decibel (dB) penalty is added for noise that occurs between the hours of 10 p.m. and 7 a.m. because nighttime noise events are considered more annoying than noise occurring during daytime. The L_{dn} descriptor is accepted by Federal agencies, including the U.S. Army, as a standard for estimating noise impact and establishing guidelines for compatible land uses.

The U.S. Department of Housing and Urban Development (HUD) has established criteria that consider areas with noise levels of $75 L_{dn}$ or greater as unacceptable living environments. The DoD, USEPA, and other agencies consider noise levels in excess of $65 L_{dn}$ as "normally unacceptable" for noise sensitive land uses such as residences, schools, and hospitals. Houses located in areas between $65-75 L_{dn}$ may not qualify for Federal mortgage insurance under HUD or Veterans Administration regulations without additional costs associated with installing noise attenuation.

The Sound Exposure Level (SEL) is the scale used to describe the energy content of flyover noise. The SEL is a single event measure of the amount of noise energy from a source normalized to one second of time. Measurements of SEL tend to be higher than single peak measurements because the energy is compressed into the one-second time period. An SEL is a combination of level and duration, thus, SEL values diminish with increased altitude of an aircraft and distance from the receptor.

3.7.2 Existing Noise Conditions

The main contributors to noise at the AASF, Fort Harrison, and the adjacent training area are aircraft, small arms, and training activities. These are described in the following subsections.

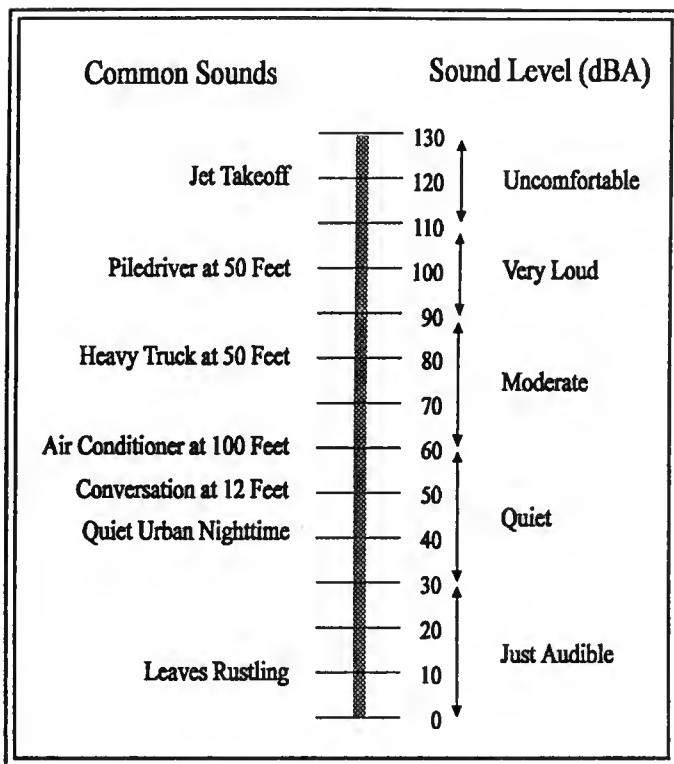


Figure 3.7-1 Typical Noise Levels

3.7.2.1 Aircraft Noise

Noise produced by aircraft during takeoff and landing operations is of major interest. These noises fall into a broad range of "transient" noises, which come and go in a finite period of time. Depending primarily on the type of aircraft, type of operations, and distance from the observer to the aircraft, the maximum flyover noise levels vary widely in magnitude. The duration of the noise also varies depending on the proximity of the aircraft, speed, and orientation with respect to the observer.

Potential sensitive receptors near the Helena Regional Airport include a farmhouse about 1,500 feet to the north and a group of houses about $\frac{3}{4}$ mile to the northwest of the AASF. Scattered residences are located along the flight paths to the training areas (MT ARNG, 1995). The areas to the west of Fort Harrison and the parcel are very sparsely populated. A few residences can be found throughout the area bordered by Cherry Creek and Blue Cloud Creek. The Helena Regional Airport conducted a noise study as part of its Master Plan. The 65 L_{dn} contour from this study is shown in Figure 3.7-2, which also shows the area of land use that is regulated to minimize incompatible land use. Background noise levels near a small airport are typically about 55 dBA. The Helena Regional Airport Authorities are currently pursuing an update to their noise analysis as part of their master plan (Mercer, 1996).

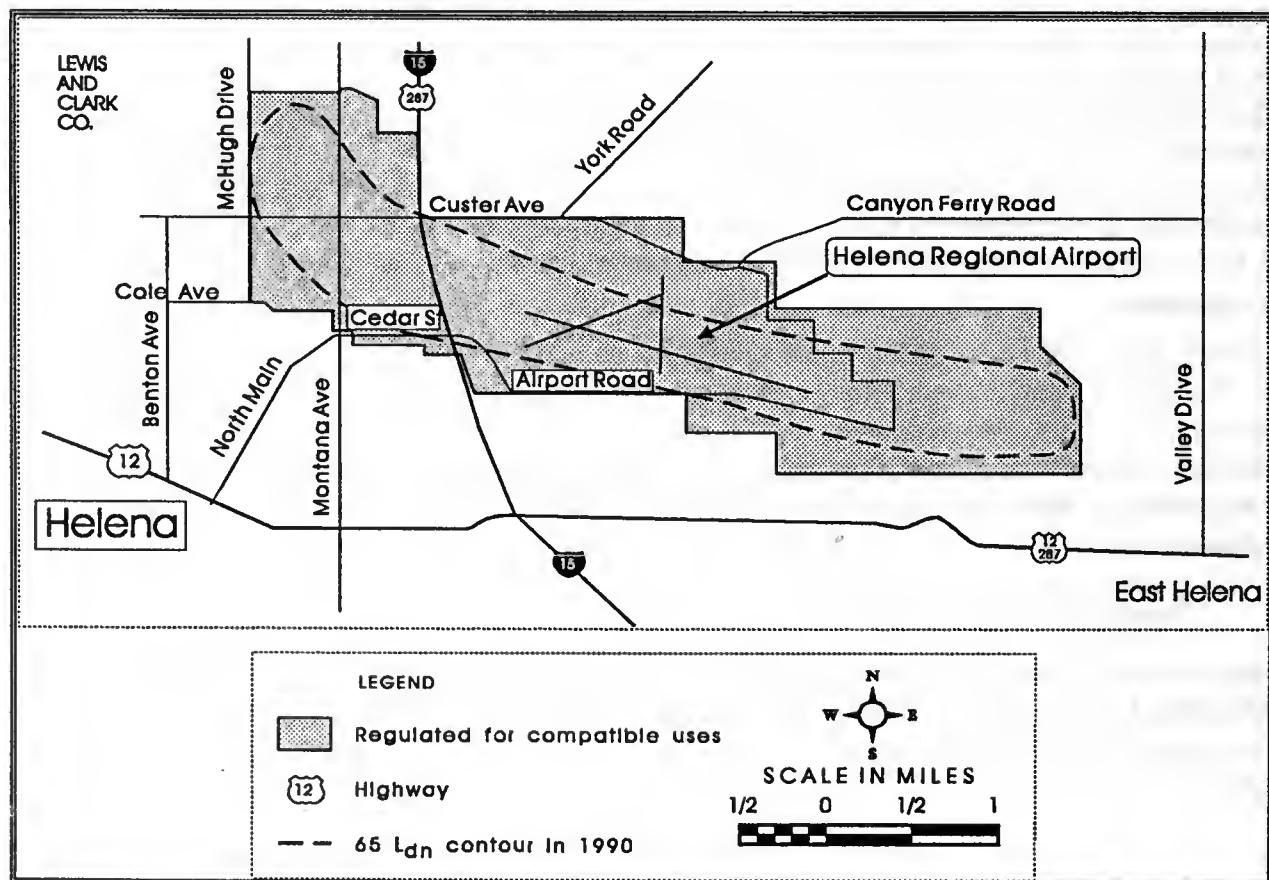


Figure 3.7-2 Current Noise Conditions at Helena Regional Airport

The current noise levels around the Helena Regional Airport are dictated by commercial aircraft. The noise generated by helicopters is generally less than typical noise generated by jet aircraft that take off, land, and fly around the airport. The MT ARNG helicopters (accounting for less than 18 percent of the airport operations) negligibly influence the size and configuration of L_{dn} contours (Mercer, 1996). In addition to changes in L_{dn} , the change in SELs serves as a means of evaluating impacts to the noise environment. The SEL noise levels for the UH-1 and UH-60 helicopters (which do most of the flying) currently operated by the MT ARNG at Helena are provided in Table 3.7-1.

Distance to Side of Path (Feet)	Sound Exposure Levels, dBA	
	UH-1	UH-60
0	92	87
200	92	87
500	91	87
800	90	86
1,000	90	86

Source: USA, 1992

The flight routes and training areas experience occasional noise from overflights of helicopters. Most of the residents in these areas are accustomed to the noise generated by the helicopters. Less than 20 noise complaints were registered with the MT ARNG during 1995, and most of those were not caused by MT ARNG helicopters (Rahn, 1996). The complaints generally do not come from residences or businesses, but tend to occur most frequently during hunting season. The MT ARNG try to avoid flying along noise sensitive areas enroute to Fort Harrison, which are marked on maps at the AASF at the Helena Regional Airport (Rahn, 1996).

3.7.2.2 Small Arms Noise

Army Regulation 200-1 (Chapter 7) implements all Federal laws concerning environmental noise from Army activities through the Installation Compatible Use Zone (ICUZ) program. The ICUZ program defines three noise zones. Table 3.7-2 presents a comparison of noise zones and weighting schemes.

Currently the Army does not use the L_{dn} to evaluate the noise from small arms ranges. The linear peak sound level (dB_P) is used to define these noise zones. The dB_P weights all frequencies of the noise equally and provides the best correlation between the noise from small arms ranges and the percent of the population highly annoyed. The decision to describe small arms range noise with dB_P was made by the U.S. Army Environmental Hygiene Agency in 1982 (Luz, 1982).

Table 3.7-2 Description of Noise Zones			
Noise Zone	Population Highly Annoyed	Transportation (dBA)	Small Arms (dBp)
I: Compatible	<15	<65 dBA	<87 dBp
II: Normally Incompatible	15-39	65-75 dBA	87 - 104 dBp
III: Incompatible	>39	>75	>104 dBp
dBAdecibels, A-weighted		<less than	
dBPdecibels, P-weighted		> greater than	
Source: USA, 1992			

The current noise levels at the training ranges at Fort Harrison are depicted at Figure 3.7-3. The normally incompatible (zone II) noise zone extends almost to the eastern and southern installation boundaries and overlaps the eastern portion of the proposed acquisition parcel. A Veterans Administration hospital is located on Fort Harrison outside of the zone II contour. The zone III contour extends into the eastern edge of the acquisition parcel.

The noise zones for the small arms ranges were generated using a model developed by the U.S. Army Environmental Hygiene Agency. The model used the "equal annoyance principle" to locate the noise zone boundaries. Under this model, the outer noise zone II boundary is located at the distance from the range where 15 percent of the population is highly annoyed. The inputs to this procedure are the range location, weapons fired on the range, and the direction of fire (USA, 1992).

3.7.2.3 Military Operational Specialty Qualification Schools Noise

Noise in the proposed acquisition area is generated primarily by dismounted infantry training and land navigation training. The majority of the noise is generated by vehicles (tanks and Bradley Infantry Fighting Vehicles) traveling on established roads within the area. The maximum speed limits for all range roads and tank trails is 25 mph for wheeled vehicles and 15 mph for tracked vehicles unless otherwise designated. The vehicles stop on the established roads and then soldiers dismount and move throughout the area while on exercise. Additional noise is generated by foot traffic and talking. Groups of soldiers typically ranging in size from two to eight move throughout the area practicing navigation, tactics, and maneuver. No live ammunition is used on the exercises. Background noise levels at Fort Harrison and the training area are similar to other rural areas averaging from 33 to 55 L_{dn}.

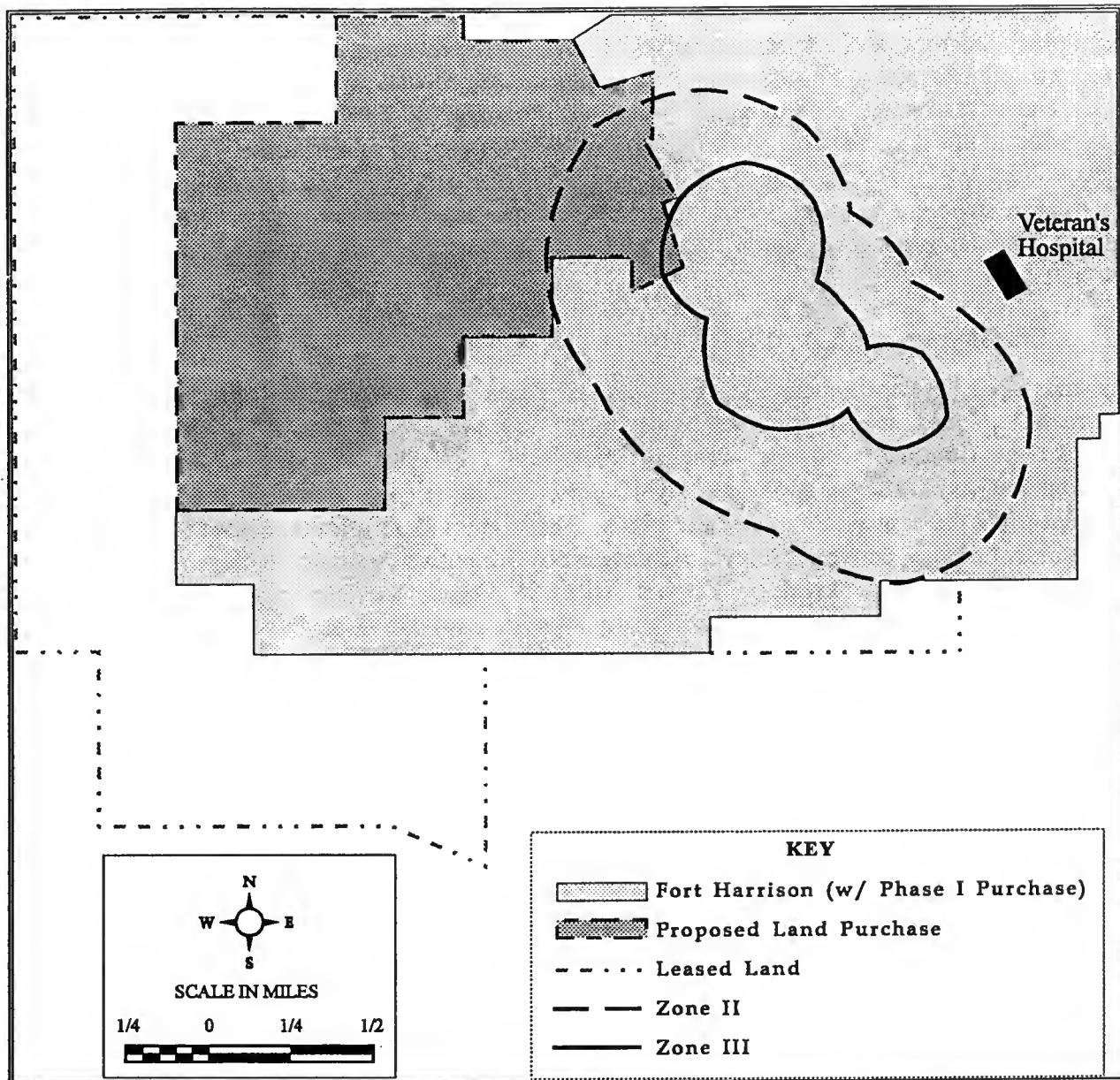


Figure 3.7-3 Noise Zones II and III at Fort Harrison

3.8 SOCIOECONOMICS

Fort Harrison is located 3 miles west of Helena, Montana. The land to be acquired under the Proposed Action or Partial Acquisition Alternative lies to the west of the fort. The city of Helena, Fort Harrison, and the proposed acquisition parcel are all located within the boundaries of Lewis and Clark County, which is defined as the region of influence (ROI) for this analysis. The area is shown in Figure 1.3-1.

Socioeconomic resources are described in this section using employment, income, and demographic measures, and a discussion of local government revenues. These elements are the key factors influencing housing demand, real estate prices, education needs, other community services, and infrastructure requirements. However, the proposed and alternative actions under consideration in this document do not include personnel changes at Fort Harrison. Therefore, the socioeconomic resource areas that are typically affected by personnel changes — the local real estate market, schools, community services, and infrastructure — will not be discussed in this document. The latest available data that are reliable, and consistent with earlier data, are used in the discussion.

3.8.1 Employment and Income

Lewis and Clark County experienced moderate employment growth during the 1980s, with employment increasing by 14 percent, compared to 9 percent for Montana as a whole and 22 percent for the United States. However, between 1990 and 1993, employment for both the county and state increased by approximately 10 percent, with average annual growth rates that were about triple the annual rate during the 1980s. These 1990-1993 growth rates are noticeably higher than that of U.S. employment, which increased by 1.2 percent total (an average annual rate of 0.4 percent). Total employment in Lewis and Clark County was approximately 32,300 in 1993, the latest year for which comparable employment data are available (U.S. Bureau of Economic Analysis, 1996).

Lewis and Clark County has a moderately diversified economy, with a high proportion of employment in the services sector, which accounts for almost one-third of all employment. Helena is the state capital and home of several Federal facilities and regional offices, and the government sector accounts for more than a quarter of county employment. Wholesale and retail trade employ 20 percent of the labor force, while the remaining sectors are quite small (U.S. Bureau of Economic Analysis, 1996). These proportions are illustrated in Figure 3-8.1.

In 1995, unemployment for Lewis and Clark County averaged 5.1 percent, while the state average was 6.8 percent and the U.S. average was 5.6 percent. However, unemployment had declined for both the county and the state by May of 1996, when the rates were 4.1 and 5.1 percent, respectively; the U.S. rate remained at 5.6 percent (Montana Dept. of Labor and Industry, Research and Analysis Bureau, 1996).

There are approximately 170 full-time employees at Fort Harrison and 65 full-time employees at the AASF, constituting less than 1 percent of the county's total employment. There are also approximately 350 MT ARNG members at Fort Harrison and 250 at the AASF; most of these part-time Guard employees live in the Helena area and have full-time jobs in addition to their Guard membership. On a typical monthly drill weekend, there are from 300 to 400 soldiers at Fort Harrison for training activities. In addition, other units use the ranges and other facilities at Fort Harrison for training; these occasional users are from outside the Helena area. Weekend users stay at Fort Harrison rather than lodging in Helena motels (Martinka, 1996).

Total personal income in Lewis and Clark County was \$937.3 million as of 1993. Per capita income (PCI) for the same year was approximately \$18,470, roughly 89 percent of the United States average PCI and 106 percent of the Montana average (U.S. Bureau of Economic Analysis, 1996).

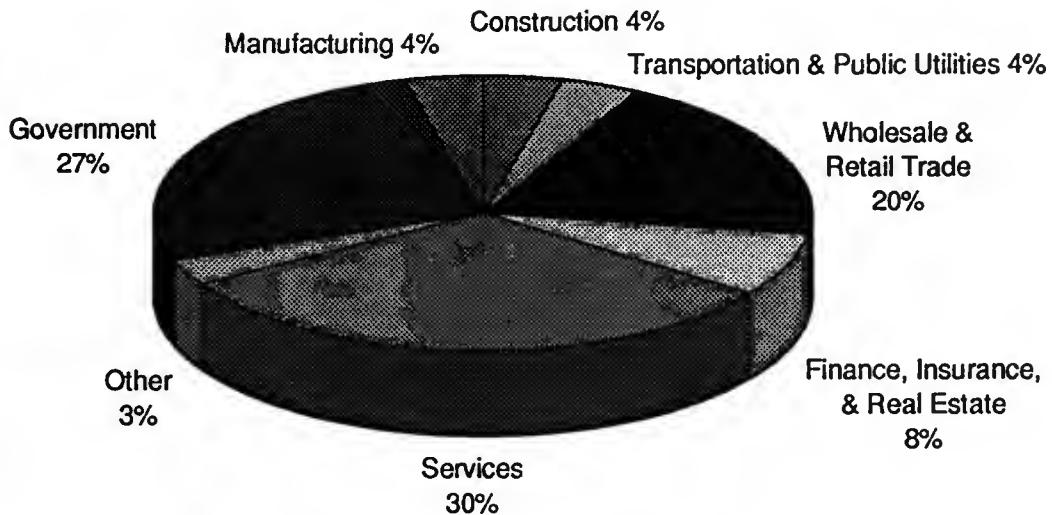


Figure 3.8-1 1993 Employment by Industrial Sector

Construction growth in the Helena area, as estimated by the dollar amount of building permits issued by the City of Helena, more than doubled from 1990 to 1995, from \$17.7 million to \$31.7 million, then declined by 18 percent to \$25.9 million in 1995. The overall increase of 67 percent in permit value between 1990 and 1995, as shown in Figure 3.8-2, is further evidence of the strong growth occurring in the Helena area (City of Helena Building Department, 1996).

3.8.2 Population

Population growth in Lewis and Clark County during the 1980s was much stronger than growth for the state of Montana. The county increased by 10.4 percent, at an average annual rate of 1.0 percent, while Montana grew by only 1.3 percent, an average annual rate of 0.1 percent. By comparison, the U.S. increased by 9.4 percent, an average annual rate of 0.9 percent. Between 1990 and 1995, however, population growth for both the county and the state was dramatically higher than the 1980s rates and the U.S. average. Lewis and Clark County grew at an annual growth rate of 2.1 percent, for a total increase of 11.1 percent during the five-year period, while Montana's average annual growth rate was 1.7 percent, yielding a total increase of 8.9 percent in population. During the first half of the 1990s, the U.S. population increased at an average rate of 1.1 percent per year, for a total 5-year increase of 5.6 percent. Lewis and Clark County had a 1995 population of nearly 53,000 (U.S. Bureau of the Census, 1990). According to a representative of the Helena Area Chamber of Commerce (Nunn, 1996), population migration into the community is continuing, spurred by economic growth and the quality-of-life amenities available in the Helena area. Most new residents are relocating from other western states, with the states of Washington and California contributing the greatest numbers.

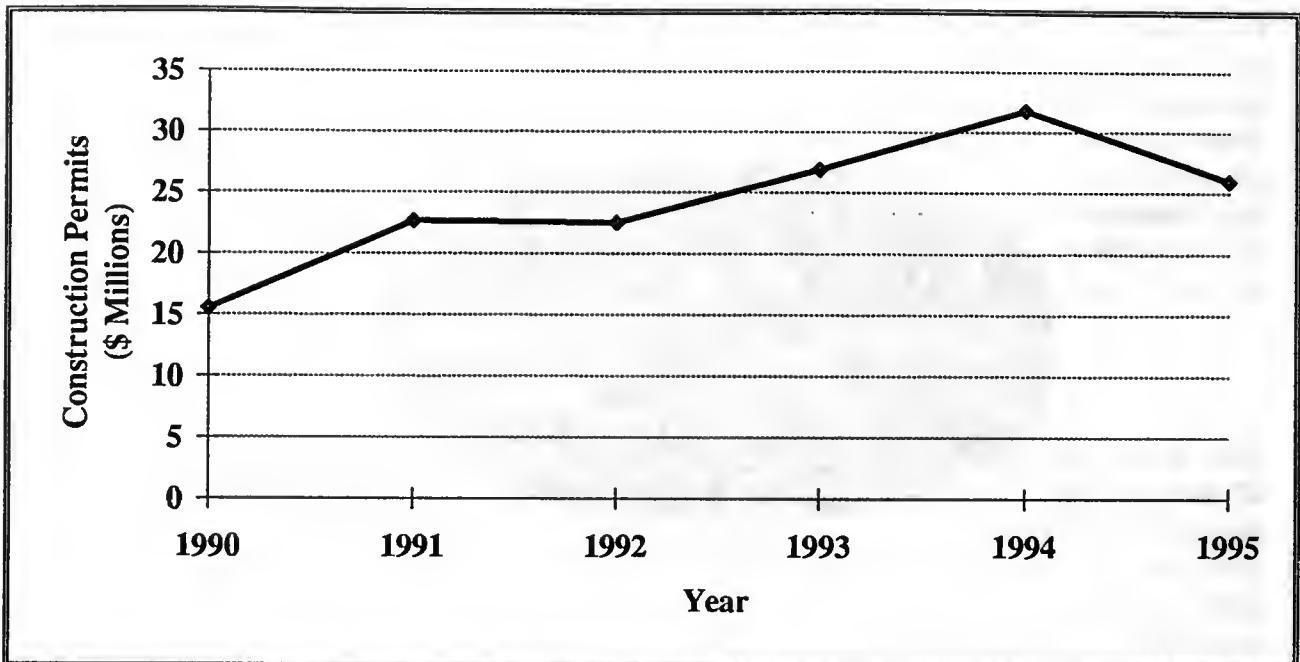


Figure 3.8-2 City of Helena Building Permits, 1990-1995

3.8.3 Environmental Justice

The 1990 Census found that Lewis and Clark County's population was nearly 97 percent Caucasian and 2.2 percent Native American, with African-American, Asian, and Other comprising less than 1 percent of the total; 1.2 percent are considered Hispanic, which can be any race. By comparison, Montana's population is nearly 93 percent Caucasian and 6 percent Native American, with 1.5 percent considered Hispanic. Less than 12 percent of the county's population are below the poverty level, while 16 percent of the state's population fall into this category (U.S. Bureau of the Census, 1990).

3.8.4 Local Government Revenue

Montana does not impose a sales tax, and county governments derive most of their income from property taxes. Property is revalued for taxation purposes every three years. Property tax revenues for Lewis and Clark County in 1995 were approximately \$31 million.

3.8.5 Summary of Growth Trends

In the U.S. as a whole, and in the State of Montana, employment growth between 1980 and 1993 outstripped population growth. This is the result of two demographic factors. First, more and more people have joined the labor force, at least on a part-time basis. Second, the population "bulge" members – "baby-boomers" and many of their offspring – are within their working years.

However, in Lewis and Clark County, population growth has also been very high, fueled by economic growth and by the amenities of life in a smaller community near the Rocky Mountains. Figure 3.8-3 illustrates the total percent change in employment and population for Lewis and

Clark County, Montana, and the United States. According to local sources, these growth trends are expected to continue into the future, as Montana natives return and new residents relocate from more congested and higher cost-of-living areas on the West and East Coasts (Helena Area Chamber of Commerce, 1996). Both the population influxes and continued economic growth increase the demand for land, driving land prices upward and extending development into formerly rural areas.

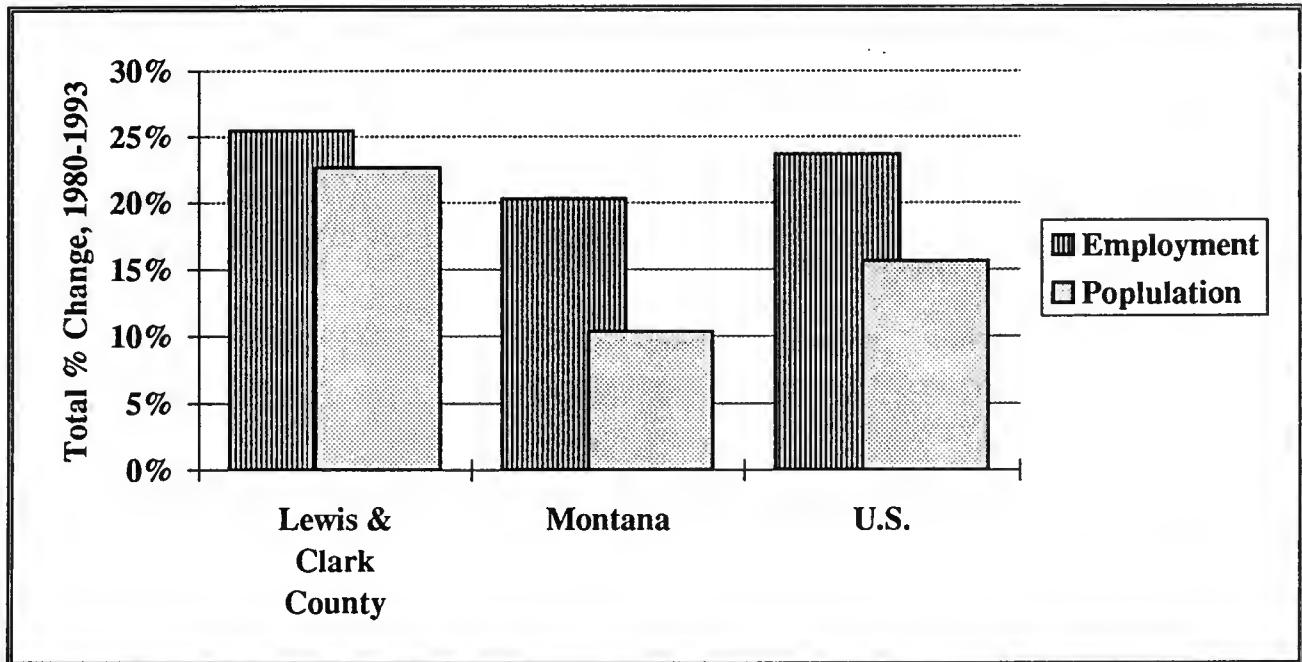


Figure 3.8-3 Comparison of Growth in Employment and Population, 1980-1993

3.9 LAND USE

The land use discussion includes a description of particular uses of land on and adjacent to Fort Harrison, constraints that affect land use, and land values.

3.9.1 Existing Land Use

Fort Harrison, a major Army training area, comprises 2,154 acres in west central Montana. Land use within Fort Harrison contains a cantonment area, with billeting, dining, latrine facilities and site support operations, ranges for small arms qualification, and a drop zone and helicopter landing area. Land on the southern perimeter of Fort Harrison is occupied by the Veterans Administration. Land use to the east, west, and north of Fort Harrison consists of scattered farms and residences, grazing land, and hilly to mountainous terrain. The nearest urban area is Helena, located 3 miles to the east with a population of approximately 35,000.

On the property to be acquired under the Proposed Action, the land use has been almost exclusively military for many years, with areas used for a variety of training activities, maneuvers,

and bivouacs (see Section 3.1.1 for a detailed description of current operations). Limited livestock (cattle) grazing occurs only a few weeks per year.

3.9.2 Existing Noise Constraints and Issues

Environmental noise from Army activities is monitored by the ICUZ program, which defines three noise zones (see Section 3.7.2.2). The Army uses these compatibility zones for land use planning to prevent conflicts with noise sensitive land uses such as residential housing and hospitals. Land uses such as commercial, industrial, and agricultural (except livestock) are compatible with most noise environments. The only sensitive receptor near Fort Harrison is the Veterans Administration Hospital. There are no existing noise constraints or issues regarding any of the MT ARNG training activities at Fort Harrison. Potential future noise issues could arise if new residences continue to be constructed in close proximity to Fort Harrison. New community members not economically dependent on the military installation may have the tendency to be more annoyed by noise related to Fort Harrison activities.

3.9.3 Existing Economic/Financial Issues

Population growth in the Helena area over the past decade has caused an increase in land prices. Some land formerly used for agricultural purposes – primarily grazing – is being converted to residential use with the development of single residence plots and subdivisions of varying sizes. At the present time, land prices west of Fort Harrison are estimated to be approximately \$2,000 per acre or more, depending on the characteristics of a specific parcel (Schock, 1996).

3.10 ENVIRONMENTAL PROGRAMS

The environmental programs at Fort Harrison include hazardous materials, hazardous waste, the Installation Restoration Program (IRP), solid waste, and wastewater. Although other programs are also managed by the MT ARNG Environmental Office (support from other offices occurs with several programs), the aforementioned programs are the ones potentially affected by the Proposed Action and will be addressed in this document. All programs are managed in accordance with applicable Federal, state, local, and DoD regulations, standards, and laws.

3.10.1 Hazardous Materials

Hazardous materials are substances that, because of their quantity, concentration, or physical, chemical or infectious characteristics, may present a substantial danger to public health or the environment if released. These materials are defined within certain laws to have specific meanings. For this document, substances identified as hazardous by the Occupational Safety and Health Act are considered hazardous materials. Examples of hazardous materials used by the MT ARNG are fuels, oils, cleaning solvents, paints and thinners, and munitions.

Most of the hazardous material used by the MT ARNG is fuel. The MT ARNG uses about 250,000 gallons of jet fuel per year, most (95 percent) of which is used at the AASF. Some refueling is done at Fort Harrison by fuel trucks brought out from the AASF. Several thousand gallons of diesel fuel and gasoline are also used each year. These fuels are brought in by truck.

Other hazardous materials, excluding munitions, are managed under the Department of Military Affairs—Montana (DMAMT) Regulation 200-8, Pollution Prevention Program, which emphasizes reductions in on-hand stocks. Hazardous materials are primarily received and distributed through the D-LOG warehouse. The warehouse monitors product shelf-life, and also tracks all hazardous material usage.

The MT ARNG has an Oil and Hazardous Substance Spill Prevention and Response Plan that is reviewed and updated annually. This plan provides for contingency planning and spill preparedness, and is designed to prevent, limit, and respond to any spills. Trained initial response and on-scene response teams provide initial and follow up containment and clean-up of spills.

The MT ARNG also has a Pollution Prevention Plan that includes hazardous material and hazardous waste reduction programs. The plan provides compliance with the Pollution Prevention Act, and is instrumental in reducing hazardous material use and waste generation. The plan also provides a means of meeting reporting requirements mandated by EPCRA.

3.10.2 Hazardous Waste

The use of hazardous materials can, in turn, create hazardous wastes. Hazardous wastes, as defined for this document, include those substances identified by the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Superfund Amendments and Reauthorization Act (SARA), and subsequent amendments. These substances would include, for example, used solvents or paint wastes. Fort Harrison is designated as a small quantity generator (EPA ID# MT8211830080). The total MT ARNG waste stream in 1995 was 6,295 pounds (MT ARNG, undated).

Management of hazardous wastes consists of collection, storage, transportation, and disposal as required by RCRA, Montana Hazardous Waste Regulations (Montana Code Annotated Title 16, Chapter 44, Section 101 et seq), and DMAMT Regulation 200-1. All records and tracking documents are maintained at the initiating facility, as well as by the Environmental Office. Comprehensive training is accomplished by the Hazardous Waste Manager of the Environmental Office and is available to all personnel. The environmental coordinator at the AASF is the installation accumulation point manager for a RCRA-permitted storage facility at the AASF. Hazardous wastes are disposed of through the Defense Reutilization and Marketing Office (DRMO) in Great Falls, Montana.

Operations that generate hazardous wastes include fueling, aviation repairs, and some maintenance on weapons. The wastes consist of oils and fuels, various solvents, batteries, and miscellaneous wastes.

3.10.3 Installation Restoration Program

Past activities at Fort Harrison have contributed to soil contamination, and may have contributed to surface water and groundwater contamination. Sampling of surface waters from ephemeral streams and drainages has found no contamination; groundwater sampling is an ongoing effort. The MT ARNG is actively pursuing an IRP to address and, as necessary, remediate the environmental concerns created by these past practices. The IRP is the basis for environmental response actions on DoD installations.

Fort Harrison has six sites that are currently being considered under the IRP. Following a review of all potentially contaminated locations, these sites were selected because they were considered environmentally significant operations (PRC, 1995). The sites are listed below:

- Southwest Asia Rebuild Center Drywell
- Williams Street Gravel Pit
- Old Ordnance Burial Trench
- Scattered Pits Area
- Landfill Burial Cells
- Railroad Tracks Stains Area

Recommendations for these sites can include no action, additional investigation, or a cleanup action. If no contaminants are found above regulatory limits, no action is taken and a site can be closed (i.e., used for other purposes). Additional investigations are undertaken when there is some doubt as to whether or not a site is contaminated. These investigations usually consist of sampling soils, surface water, or groundwater. A site may then be declared as clean and not needing further action, or the site may need to be remediated. The cleanup or remediation of a site is generally a lengthy process, and may be followed by long-term monitoring. Designated IRP sites being investigated or remediated should not be otherwise disturbed, since the sites may pose a human health or safety threat, and because contaminants may be spread to other areas.

While military training activities have deposited unknown quantities of unexploded ordinance (UXO) and lead from spent ammunition, other non-military activities can also produce contaminated sites. Often, mining operations result in long-term soil or water contamination, both due to mining practices (e.g., the use of mercury in some types of gold mining practices) and the release of naturally-occurring contaminants (e.g., arsenic found in rock can be released from mine tailings).

3.10.4 Solid Waste

Most base and training activities generate solid waste. Solid waste generated during field training and at Fort Harrison is collected and disposed of through a contract or is recycled. There are no operating landfills on the base; solid waste is sent to the Helena Transfer Station. Fort Harrison recycles paper, cardboard, and packing materials, and maintains data on recycling under DMAMT Regulation 200-8. An estimated 42 tons of mixed paper and 46 tons of cardboard are recycled annually (MT ARNG, 1995e). Metals are also segregated and turned in to DRMO. An estimated 1,000 pounds of shells and spent practice munitions are recovered each month (including Limestone Hills materials).

3.10.5 Wastewater

Fort Harrison currently sends wastewater to two non-discharging wastewater lagoons owned by the Veterans Administration. The lagoons have capacities of 435,000 and 160,000 cubic feet. Fort Harrison shares the lagoons, and a 12-inch sewer main, with the Veterans Administration.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4. ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential for significant impacts to the human environment as a result of implementing the Proposed Action, Partial Acquisition Alternative, or No Action Alternative. As defined in 40 CFR §1508.14, the human environment is interpreted to include natural and physical resources, and the relationship of people with those resources. Accordingly, this analysis of the program has focused on identifying types of impacts and estimating their potential significance. This chapter discusses the effects that the Proposed Action or alternatives could generate in environmental and socioeconomic resource areas, previously described in Chapter 3.

The concept of “significance” used in this assessment includes consideration of both the context and the intensity or severity of the impact, as defined by 40 CFR §1508.27. Severity of an impact could be based on the magnitude of change, the likelihood of change, the potential for violation of laws or regulations, the context of the impact (both spatial and temporal), degrees of adverse effect to specific concerns such as public health or endangered species, and the resilience of the resource. The criteria used to differentiate between significant and insignificant impacts are introduced at the beginning of each resource section. If a resource is not affected by existing activities or would not be affected by a proposed activity, a finding of no impact was declared. If a resource has been measurably improved by existing activities or would be measurably improved by a proposed activity, a beneficial impact was noted.

Adverse impacts can be mitigated through avoidance, minimization, remediation, reduction, or compensation. Proposed measures to mitigate adverse impacts are identified, and other potential measures of mitigation are suggested within each resource section, as applicable. Certain mitigations are required by law, while others are standard practices; this document presents these mitigations, as well as others necessary to minimize impacts. Listing of the mitigations assists the project proponents in maintaining compliance with environmental regulations.

This chapter is organized by resource element in the same order as introduced in Chapter 3. For each resource section, the analysis methods are described, impacts of existing activities on Fort Harrison are presented, potential impacts of the Proposed Action, Partial Acquisition Alternative, and No Action Alternative are presented, then mitigations (both required and recommended) are presented. The chapter continues with a discussion of the compatibility of the Proposed Action with objectives of Federal, state, and local land use plans, policies, and controls, an evaluation of the relationships between short-term uses of the environment and long-term productivity, cumulative impacts (introduced in the subsequent paragraph of this section), and irreversible and irretrievable commitments of resources.

The Proposed Action would proceed with other ongoing and future programs at Fort Harrison. The additive effect of the actions could result in cumulative impacts to the biological, physical, and socioeconomic environment in the region of influence. The significance of the individual impacts of the Proposed Action, when considered collectively with the potential impacts of other actions, may change. Section 4.13 addresses cumulative impacts by resource element.

4.1 OPERATIONS AND SAFETY

The Proposed Action does not include any increased aircraft or ground operations at Fort Harrison, and there would be no impact to aircraft or range operations. There would also be no impact to operations under the Partial Acquisition Alternative or the No Action Alternative as long as the existing lease arrangements continued. However, if the range areas were no longer available, there would be a significant impact to Fort Harrison operations. The Proposed Action would provide a beneficial impact to safety because it would ensure that the ranges and safety zones were maintained for future training. Under the Partial Acquisition Alternative, safety benefits would be less than for the Proposed Action. Safety would be insignificantly affected due to potential range encroachment under the No Action Alternative.

Newly required operational or safety procedures that would adversely affect the operation of the training ranges would be considered significant. Additionally, any new limits on operations or any compromise to safety would also be considered significant. Increased operational capability, or improvements in safety procedures through implementation of a new program or expansion of land controlled within safety zones, would be considered beneficial impacts.

4.1.1 Analysis Methods

The impacts of existing and planned activities on operations and safety were assessed by evaluating flying, range firing, and ground training activities above and around Fort Harrison. The review included discussions with AASF operations personnel as well as operations personnel in charge of the live fire ranges and training areas.

4.1.2 Impacts of Existing Activities

There are insignificant impacts to existing activities as they relate to operations and safety. Military helicopter flights out of the Helena Regional Airport currently account for 18 percent of total operations; the proportion is decreasing as military flights remain stable and additional civil aircraft operate from the airport (Mercer, 1996). Firing range operations require securing of the ranges to prevent accidents. The new Range Facility Management Support System that was discussed in Section 3.1.1.2 will provide a more accurate range access tracking capability.

4.1.3 Potential Impacts of the Proposed Action

There would be no adverse impacts to Fort Harrison operations due to the Proposed Action. Current flight operation training levels would be maintained at the same level of activity, and the ownership of the land is not relevant to the flight training activity. The only change in ground training operations would be the additional area available for bivouac training. This additional area would assist the training area managers in rotating bivouac areas and allow the capability for future expansion of this activity.

Under the Proposed Action, some existing ground activities may disperse into the acquired parcel. Consequently, assuming a relatively constant level of operations, less activity would occur in the existing training area; safety within the acquisition parcel would remain the same as there is no change in the safety zones that are dictated by U.S. Army and state regulations. The Proposed

Action would result in ownership of additional land within a safety zone, providing a long-term benefit to range safety.

4.1.4 Potential Impacts of the Partial Acquisition Alternative

Government control of the range areas is essential in order to maintain a training range operation at Fort Harrison. Under this alternative, safety areas dictated by the U.S. Army and the state could not be guaranteed. If development occurred in the non-acquired area, the M16 and M60 training ranges would be eliminated. The mission capability of Fort Harrison would be reduced with the potential for a further decrease in operations. Although the operation of the range would be significantly impacted, range safety would not be significantly affected. The benefit of owning additional land within a safety zone would be less than under the Proposed Action.

4.1.5 Potential Impacts of the No Action Alternative

The potential for loss of training, if the land were withdrawn from the Fort Harrison training complex and development occurred, would have an adverse and significant impact on the U.S. Army and other Federal agencies in their ability to train personnel. The M16 and M60 firing training ranges would be closed because the safety fans would no longer be in controlled areas. Although these range operations would be adversely impacted, range safety would not be significantly affected.

4.1.6 Mitigations

There would be no significant impacts to operations or safety from the Proposed Action. Therefore, no mitigations are required.

4.2 AIR RESOURCES

Based on the analyses described in this section, the ongoing MT ARNG operations and use of the training parcels have minimal impacts on air quality in the Helena area. Air quality would not be impacted as a result of the Proposed Action. For the Partial Acquisition Alternative and the No Action Alternative, insignificant air quality impacts are projected to occur based on the potential for development within the subject land.

An air conformity determination is not needed for the ongoing or proposed MT ARNG activities. The emissions from MT ARNG activities would not affect the non-attainment area near East Helena, and would not affect the current attainment classification of the surrounding region.

The significance of impacts to air quality is based on Federal and state pollution regulations and standards. A violation of the NAAQS or MAAQS (see Table 3.2-1) would be a significant impact. Excessive or frequent exposures of sensitive receptors to increased pollutant concentrations, due to high emission rates or proximity to a source, would be another significant impact. Any reduction of visibility at a Class I area could also have a significant impact. A beneficial impact to air quality would be a reduction in baseline emissions.

4.2.1 Analysis Methods

The assessment of potential impacts to air resources focused on emissions from all MT ARNG operations, travel by MT ARNG personnel to and from Fort Harrison, and road maintenance at or near the acquisition parcel. Weather, climatic conditions, and proximity to sensitive receptors were considered.

Reference documents provided pollutant criteria and emission factors for dust, vehicles, aircraft, and support equipment. Grader emission factors were obtained from tables found in the Compilation of Air Pollutant Emission Factors (AP-42) (USEPA, 1995).

The projected emissions were compared to existing ambient air quality. The effects of climatic conditions, existing air emission sources, and receptors, as described in Section 3.2.2, were considered in the assessment. The assessed changes were compared to the significance criteria to determine the potential impact of the action.

4.2.2 Impacts of Existing Activities

Air quality is only slightly affected by the activities described in Chapter 2. Impacts will be long-term, and coincide with the MT ARNG activities.

There is some dust (including PM₁₀) generated by training and road maintenance. The quantity of dust emissions from operations is related to the number of vehicles being used, the level of activity, the conditions of the roads at the time of the operations, and road maintenance conducted. Most activity occurs during dismounted infantry training, with up to 120 personnel training once per month. Vehicles are only used for transporting personnel to the training area, then remain on existing roads. Assuming a dry condition, five miles per day, ten trips, and a dust emission factor of 0.135 pounds/vehicle mile traveled (USEPA, 1995), the maximum amount of emissions from fugitive dust is about seven pounds per month during peak operations. Persistent winds during most of the year also provides for a good dispersion of air pollutants, and these emissions are insignificant. The activities have a minimal impact on atmospheric opacity. Degradation of visibility at PSD Class I areas does not occur, due to the limited emissions and the distance from Fort Harrison to a PSD Class I area (e.g., the Gates of the Mountains Wilderness Area is 20 miles distant).

Overall amounts of criteria air emissions can be substantial. For example, NO_x emissions from MT ARNG helicopters can exceed 20 tpy (MT ARNG, 1992; US Army, 1993). However, these emissions are distributed throughout the entire area, with most emissions occurring in the vicinity of the Helena airport. The quantities of emissions in the training area depends upon flight time, height of operations, and weather conditions. Estimated emissions (assuming that 10 percent of all flight operations would occur at ground level in the training area), are about 330 pounds of NO_x per month. This amount of NO_x is not significant.

Personal travel by the MT ARNG personnel (i.e., privately owned vehicle mileage) also does not significantly increase any criteria pollutant. Using an average of 5 miles of travel per day, 170 full time personnel, all calculated emissions based on travel in the training area are negligible. For example, NO_x emissions from personnel travel total 0.18 tpy. Any pollutants disperse to well below ambient air quality standards, as measured at monitoring stations. Existing quantities of

criteria air pollutants are not significant; the total of all actions by the MT ARNG would need to total 100 tpy to be considered significant.

There would not be an impact on any nearby sensitive receptor. Sensitive receptors are located 0.5 mile to 1.0 mile from the training site. Criteria pollutants, as described, would be minimal, and only minor quantities of HAPs are generated by the MT ARNG. For example, miscellaneous units/sources of HAPs at Fort Harrison generate 0.00236 tpy (MT ARNG, 1996e) or about 0.4 pounds per month. The major source of HAPs, a paint booth which generates 8.78 tpy, would not be affected. Adding a generator or additional minor cleaning of weapons in the field would not increase the 0.4 pounds of HAPs per month. The natural dispersion of the pollutants, due to the winds and atmospheric turbulence, would also keep HAPs from reaching any sensitive receptor.

No ODSs would be used as a result of the Proposed Action; DMAMT Regulation 200-8 mandates the elimination of most ODSs.

4.2.3 Potential Impacts of the Proposed Action

Air quality would not be changed noticeably if the purchase of the currently leased areas was to occur. Only slight changes in the location of emissions (different field locations) and the addition of some very minor emission sources (e.g., a field generator) may result. Maintaining roads, changing the numbers and types of field training (assuming no major emission sources or generation of HAPs would be included), and altering the locations or numbers of helicopter flights in the training area would not noticeably affect air quality; there would be no impact.

4.2.4 Potential Impacts of the Partial Acquisition Alternative

The emissions from purchasing a portion of the range area would be the same as if the entire parcel is purchased. If the M16 and M60 ranges were not operated due to encroachment, a minor reduction in total MT ARNG air emissions would occur. However, any other type of use or development would have some air quality impact. The impact would depend upon the type of use or development; housing development would have temporary and minor air quality impacts, while industrial development could have substantial air quality impacts. Air quality impacts as a result of development would likely be insignificant.

4.2.5 Potential Impacts of the No Action Alternative

Air emissions would continue to occur at the existing levels if no property is purchased. If the M16 and M60 ranges were not operated due to encroachment, a minor reduction in total MT ARNG air emissions would occur. However, other uses or development would have some air quality impact as described for the Partial Acquisition Alternative.

4.2.6 Mitigations

Adverse effects to air quality can be mitigated by employing mitigation measures. Although the study area is in attainment status for all pollutants and there are no projected significant impacts, two mitigation measures are suggested to minimize air emissions. The first is to reduce fugitive dust from grading, grading operations should be suspended when wind speeds (as instantaneous gusts) exceed 25 mph. The other is to continue to develop and implement pollution prevention

measures that identify alternate processes or material substitutes that can reduce or eliminate ODSs or HAPs from operational activities (e.g., painting, cleaning).

4.3 GEOLOGICAL RESOURCES

The results of this analysis indicate that no impacts to the geology/physiography or seismicity would occur from the Proposed Action; soils and minerals would be insignificantly affected. Fort Harrison's mission would be adversely affected if mining or other development occurred within the proposed acquisition area under the Partial Acquisition Alternative and the No Action Alternative. The soils in the acquisition area have moderate to severe limitations on construction. Consequently, potentially significant impacts could be caused from construction of dwellings, or other inhabited structures, under the Partial Acquisition or No Action Alternatives.

For this analysis, an impact was determined to be potentially significant if a regional or local resource is depleted, if a major geological hazard were affected, or if a substantial increase in the rate of erosion or a major change in the characteristics of the soil would occur. Adverse impacts would be insignificant if the area of potential impact is slight (not bearing on the relevance, importance, or level of concern for the resource in the affected region). Beneficial impacts would occur if the action offsets a hazard or restores the resource.

4.3.1 Analysis Methods

The analysis of impacts to geological resources was based on a literature review of existing data and publications for the potentially affected location. The review included an interim soil survey, topographic maps, and U.S. Geological Survey documents. To determine potential impacts, the analysis focused on potential adverse changes to baseline conditions of identified geological resources (see Section 3.3), with the significance of an impact based on the aforementioned significance criteria.

4.3.2 Impacts of Existing Activities

4.3.2.1 Physiography/Geology

Existing training activities are not impacting the physiography or geology of the area.

4.3.2.2 Soils

Existing activities minimally affect soil conditions through training activities and maintaining roads. Foot traffic occurs within many different areas, thus minimizing soil disturbance due to vehicles in any given area. Training activities are scheduled to avoid overuse of a particular area. Vehicle traffic is limited to roads, and livestock grazing is minimal. The amount of soil disturbed by rotor wash (wind currents generated by the rotors) is currently not causing any significant erosion. As discussed in Section 3.3, the hazard of erosion is slight to moderate, depending on the slope of an area. Minor scattered areas of erosion could periodically occur.

4.3.2.3 Minerals

There are a few gold prospects located along the western edges of Fort Harrison. There are a few dozen gold prospects in the land currently leased and proposed for acquisition. None of these

prospects are currently being mined. No other minerals are currently being mined in the area surrounding Fort Harrison.

4.3.2.4 Seismicity

Fort Harrison is located in an area with the potential for earthquakes causing major damage (see Section 3.3). No major damage has occurred in the last 40 years. Older buildings could suffer substantial damage in the event of a major earthquake. Newer buildings, or any constructed in the future, would be required to meet standards for reducing damage from quakes (in accordance with Army Technical Manual 5-809-10, Seismic Design for Buildings).

4.3.3 Potential Impacts of the Proposed Action

4.3.3.1 Physiography/Geology

Regardless of whether the parcel is acquired, there are plans to regrade some gravel roads, replace culverts, and add new gravel. This construction activity would be shallow in nature and not adversely impact the physiography or geology of this parcel of land.

4.3.3.2 Soils

Although no construction is planned under the Proposed Action, small areas of the parcel would be disturbed under a separate road maintenance program. Soils would be temporarily disturbed, causing a short-term insignificant impact. Training activities would not appreciably change under the Proposed Action. Training (including bivouac exercises) would occur in the proposed acquisition area. Vehicles would be limited to existing roads. Helicopter training flights would continue in the area. The amount of soil disturbed by rotor wash (wind currents generated by the rotors) would not increase. Limited grazing would continue. Activities under the Proposed Action would not cause any significant erosion or change in soil properties.

4.3.3.3 Minerals

Mineral rights would be acquired as part of the Proposed Action. This would ensure that mining (which could interfere with the mission of Fort Harrison) would not occur. There is currently no commercial mining in the vicinity of Fort Harrison. No significant impacts to mineral resources would occur as a result of acquiring mineral rights for the proposed acquisition area because potential gold reserves in the vicinity of Fort Harrison have never been considered economical to support commercial mining.

4.3.3.4 Seismicity

The activities in the proposed acquisition parcel would not affect the seismicity of the area. Seismic risks associated with faults in the vicinity of Fort Harrison would continue at existing levels.

4.3.4 Potential Impacts of the Partial Acquisition Alternative

This alternative includes the purchase of the eastern half of the area identified under the Proposed Action. Leasing of the other areas could continue indefinitely or expire, allowing potential development.

Impacts to physiography, geology, and soils would be similar to the Proposed Action, except for potential development which could occur if the lease expires. The seismicity of the area would not be affected.

Soils in the area currently leased and not proposed for purchase under this alternative have moderate to severe limitation for construction of dwellings due to steepness of slopes. These soils are vulnerable to erosion if the soils are disturbed. If the lease expired for this area and if development of housing or other structures occurred, potentially significant impacts could result from soil disturbance. Any structures built would be required to meet seismic codes for this area.

Mineral rights would be acquired for the area purchased under this alternative. Most of the existing prospects are outside of this area. The possibility, although unlikely, would exist that mining could occur on lands that would continue to be leased by Fort Harrison. Most of the prospects are within the range fans and surface danger zones of the M16 and M60 training ranges. If mining occurred within areas used by Fort Harrison, the military training mission would be adversely affected. The M16 and M60 training ranges would close and the mission capability of Fort Harrison would decrease.

4.3.5 Potential Impacts of the No Action Alternative

Neither the land or mineral rights would be acquired under the No Action Alternative. Impacts would be similar to those described under the Partial Acquisition Alternative, except the extent of potential development would be somewhat larger. Current activities (training and grazing) would continue. Soils would continue to be affected at current levels, unless development of housing occurred. Soil limitations for constructing dwellings or other structures range from slight in portions of the eastern half of this parcel to severe (due to the steepness of slopes) in the western half. Soils in the eastern half of the parcel are generally less vulnerable to erosion compared to the soils in the western portion of this area. If the lease expired for this area and if building of structures occurred, potentially significant impacts could result from soil disturbance. Any houses constructed would be required to meet seismic codes for this area.

Mineral rights would not be acquired for the areas currently leased under this alternative. The possibility, although unlikely, would exist that mining could occur on lands that would continue to be leased by Fort Harrison. Impacts to Fort Harrison's mission from development of mineral rights would be adverse.

4.3.6 Mitigations

No significant impacts to geological resources were identified under the Proposed Action or alternatives. Current management of the range (limiting vehicle traffic to existing roads and rotating the use of training areas) should continue.

4.4 WATER RESOURCES

Water is a finite but renewable resource whose quality can be degraded by contaminants, and whose quantity can be altered by physical disturbances which alter the hydrology of the area. Under the Proposed Action, water resources (surface water, groundwater, and water quality) would not be impacted. Because development could potentially occur under the Partial Acquisition Alternative and the No Action Alternative, impacts to water resources are projected to be insignificant. Impacts to wetlands are discussed under Biological Resources in Sections 4.5.2 and 4.5.3.

An impact to water resources would be considered potentially significant if an aquifer, groundwater well, or surface water body is adversely affected, resulting in a measurable change in a user's water supply, or if a water quality criteria, such as an MCL, is exceeded. A decrease in groundwater recharge and increase in runoff could also be significant if the stormwater system could not adequately handle the increased volume of water, and the increased potential for flooding. No impact would result if no measurable change would occur. A beneficial impact would result from an improvement to water quality or quantity by decreasing contaminant levels, increasing groundwater recharge, or decreasing the potential for future contamination.

4.4.1 Analysis Methods

The analysis of water resources includes the potential impacts to surface water, groundwater, and water quality. Documents reviewed for information included previous NEPA documents, United States Geological Survey (USGS) maps (7.5 minute series), land use plans, hydrogeological maps, and installation maps showing surface water features. The types of groundwater impacts evaluated include those which could result during military operations (e.g., spills of hazardous materials). Surface water impacts could also result from spills or from increased erosion due to training activities. Potential impacts to wetlands are described in Section 4.5.

4.4.2 Impacts of Existing Activities

Aquifers at Fort Harrison and the fractured bedrock in the training areas are susceptible to contamination, which could result from spills. However, activities in the training area include a very limited use of hazardous materials (e.g., fuel for a generator). These materials pose little threat of a spill because the materials are only used during occasional training exercises, and only small quantities of materials are used. If a spill occurred, the impact to groundwater would not likely be significant, since any spill would be small and since the MT ARNG uses a spill response plan to mitigate spills. The dry climate of the area minimizes the potential for a spill to migrate.

Past activities involved the use of the training area for firing more types of and larger projectiles than currently used. Recent munitions have lead levels much reduced from previous munitions. The arid climate of the area minimizes the possibility of lead leaching from unrecovered ordnance and reaching the groundwater.

Surface waters can also be affected by spills or from soil erosion. Spills would not have an impact since little hazardous material is used and because the materials are infrequently used, and because permanent surface waters are not located at the bivouac areas or along roads. Soil erosion, which could result in air- or water-transported sediment, from training exercises is negligible. Vehicles

are only driven on established roads, and foot traffic and wear on vegetated areas is monitored. When a bivouac area has been used for a certain period of time, a new area is designated. Surface water has been sampled and analyzed for lead, as well as other metals. No concentrations were above MCLs (Martinka, 1996).

There have been no significant impacts to groundwater or surface water resources from the use of the training areas.

4.4.3 Potential Impacts of the Proposed Action

Water quality would not be changed noticeably if the currently leased areas were purchased. There are currently four bivouac areas; with the purchase of the parcel, another two areas may be established. Only slight changes in the surface water runoff may occur as the result of adding new bivouac areas; surface vegetation would remain in better condition and less soil erosion would occur. Improving (grading, emplacing culverts, and adding gravel) roads may slightly alter surface runoff, but since there is infrequent precipitation and runoff, and no permanent surface waters are located on the properties proposed for acquisition, no impact to surface waters would be anticipated.

Although acquisition of the properties would include water rights, no permanent surface waters and no known aquifers (fragmented bedrock may hold some water) are located on the properties. There would be no planned use of water resources on the acquired parcel, and there would be no impact to water resources in surrounding areas as a result of implementing the Proposed Action.

4.4.4 Potential Impacts of the Partial Acquisition Alternative

The impacts to water resources from purchasing a portion of the parcel and leasing the remaining land with the same restrictions of the current leases would be similar to those of implementing the Proposed Action. If the M16 and M60 ranges were not operated due to encroachment by private housing or other structures, the potential for MT ARNG activities to affect water resources would be reduced compared to current conditions. However, development (e.g., foundation excavation, road construction, emplacement and operation of a water supply system) could insignificantly affect water resources. For example, air- and water-transported erosion would increase and the potential for spills would increase. The type and magnitude of the impacts would be dependent on the type and extent of development.

4.4.5 Potential Impacts of the No Action Alternative

Water resource impacts from continuing to lease the properties under the same conditions as the current leases would be the same as described in Section 4.4.2. If development occurred, the M16 and M60 ranges would need to be closed and the potential impacts from MT ARNG activities would be reduced. However, adverse impacts to water resources could occur from development. The type and magnitude of the impacts are predicted to be insignificant and would be dependent on the type and extent of development.

4.4.6 Mitigations

No adverse impacts to water resources would occur from implementing the Proposed Action. Therefore, no mitigation measures are required.

4.5 BIOLOGICAL RESOURCES

Impacts to biological resources from existing activities on Fort Harrison result primarily from foot and vehicular traffic, bivouacs, and occasional helicopter flyovers; however, these activities do not lead to degradation of critical habitat or risk the viability of threatened or endangered flora or fauna. Impacts to biological resources on Fort Harrison from existing activities are insignificant. Implementation of the Proposed Action would not result in any significant impacts to vegetation, wildlife, and wetlands. No impacts would occur to sensitive, threatened, or endangered species. No development or expansion of activities is proposed for the parcel; therefore, impacts are similar to those from existing activities. Under the Partial Acquisition and No Action Alternatives, impacts to vegetation and wildlife would be similar to those under the Proposed Action, but be slightly more adverse; no impacts to T&E species would occur. However, the wetlands area could be significantly affected if development occurred under either of the alternative actions.

Biological resources are plants and wildlife, including sensitive, Federally- or state-listed endangered or threatened species, and wetland areas. Impacts to biological resources could be significant if the viability of protected plant or animal species was jeopardized, with little likelihood of re-establishment after completion of the action. A lesser impact could result if the disturbed population could be reestablished to its original state and condition, or the population was sufficiently large or resilient to respond to the action without a measurable change. The significance of an impact is also dependent upon the importance of the resource, and the proportion of the resource that could be affected relative to its occurrence in the vicinity. An increase in population numbers in response to an enhanced habitat, or the increased viability of a species, could be considered a beneficial impact. Significant impacts on wetlands could occur if activities associated with the Proposed Action resulted in altered hydrologic flow, drainage of sediment or contaminants into surface waters or wetlands areas, or actual filling or destruction of a wetland area.

4.5.1 Analysis Methods

The analysis of potential impacts to biological resources focused on the locations used for training activities relative to various habitats on Fort Harrison. Previous NEPA documents and a biological survey conducted for the acquisition parcel were reviewed to provide data on existing biological resources on Fort Harrison. Agency contacts regarding biological resources in the area included the Montana Natural Heritage Program, Natural Resources Conservation Service, Montana Department of Fish, Wildlife, and Parks, and personnel at Fort Harrison.

4.5.2 Impacts of Existing Activities

4.5.2.1 Vegetation

Existing activities minimally impact vegetation. All vehicle traffic is restricted to existing roads, bivouac areas are rotated among three or four different sites to minimize impacts to vegetation, and dismounted infantry maneuvers and land navigation courses traverse various terrain within the Fort Harrison training areas. The MT ARNG currently restricts use of lands for activities during wet periods to minimize damage to vegetation (Martinka, 1996). Impacts to vegetation from existing activities are considered insignificant.

4.5.2.2 Noxious Weeds

Fort Harrison would continue to contract for the spraying of noxious weeds. Existing activities would not change; therefore, insignificant impacts are anticipated.

4.5.2.3 Wildlife

Existing activities have an insignificant impact on wildlife. Cattle that graze over portions of Fort Harrison are not affected by current activities, and MT ARNG personnel perform their activities accounting for the presence and proximity of cattle (Martinka, 1996). Existing helicopter flyovers may disturb or startle wildlife by visual intrusion and noise; however, cattle, elk, and deer generally show minor reactions and experience negligible effects from helicopter flyovers (MT ARNG, 1995). Impacts to wildlife from existing activities are considered insignificant.

4.5.2.4 Sensitive, Threatened, or Endangered Species

No sensitive, threatened, or endangered species are known to exist on Fort Harrison; therefore, there are no impacts from existing activities. Streams on Fort Harrison are intermittent (see Section 3.4.1) and do not provide habitat for the cutthroat trout. While Fort Harrison has not been surveyed for the flammulated owl, no habitat (old-growth pines) for the owl is known to exist. There are no trees near the firing ranges and other training such as dismounted infantry and land navigation does not impact any tree species. The gray wolf has not been sighted in the immediate vicinity of Fort Harrison.

4.5.2.5 Wetlands

There are no wetlands known to exist on Fort Harrison. The area recently designated as a wetland by the Natural Resource Conservation Service does exist on an area currently leased by the MT ARNG (See Section 4.5.3.5). No activities (bivouac, land navigation, or dismounted infantry) currently take place within this area. No development or change is proposed for this area as part of existing activities.

4.5.3 Potential Impacts of the Proposed Action

4.5.3.1 Vegetation

The Proposed Action would not result in any changes to the vegetation on the acquisition parcel. No development is anticipated on the proposed acquisition parcel and no new activities are planned. If the parcel is acquired, it would be used to provide additional bivouac areas. Bivouac areas would be rotated on the parcel resulting in insignificant impacts to vegetation. The MT ARNG would restrict use of the parcel for bivouac, dismounted infantry, and land navigation courses during wet periods to minimize damage to vegetation (Martinka, 1996). Dismounted infantry training and land navigation courses would use various terrain on the parcel and would cause insignificant impacts to biological resources on the parcel.

4.5.3.2 Noxious Weeds

If the MT ARNG purchases the parcels, this area would be added to their contract for spraying of noxious weeds. Insignificant impacts are anticipated as a result of the Proposed Action. Spraying of noxious weeds in the upgradient portion of the wetland area would need to be done according to particular methods (see Section 4.5.3.5).

4.5.3.3 Wildlife

The Proposed Action would not result in any impacts to wildlife on the acquisition parcel. Cattle currently graze on the parcel and the MT ARNG avoid the cattle when they conduct their activities (Martinka, 1996). If the MT ARNG purchased the parcel, cattle would be restricted from grazing over the parcel with the exception of two, two-week periods for the cattle to travel from one area to another (Martinka, 1996). Grazing land is plentiful and the restriction on this parcel would not significantly impact the cattle. The majority of the elk and mule deer use the area in winter/spring from December through April. Training activities on the acquisition parcel are primarily during spring and summer months and therefore do not impact elk or mule deer. Impacts to wildlife from helicopter flyovers on the parcel would be the same as impacts from existing activities.

4.5.3.4 Sensitive, Threatened, or Endangered Species

The Proposed Action would not result in any impacts to sensitive, threatened, or endangered species. The biological survey, conducted as part of the Proposed Action, did not identify any sensitive, threatened, or endangered species on the parcel. There is no suitable habitat on the parcel for the cutthroat trout due to the absence of perennial streams or other bodies of water. According to the biological survey, suitable habitat for the flammulated owl is present on the acquisition parcel; however, none were detected during the survey nor were any owl “castings” found beneath cavity-bearing trees. No development is proposed for the parcel and no trees would be disturbed during activities on the parcel. No sightings of the gray wolf have been reported within the immediate vicinity of the acquisition parcel and none were observed during fieldwork for the biological survey.

4.5.3.5 Wetlands

The Proposed Action would not result in any impacts to wetlands. No activities (bivouac, land navigation, or dismounted infantry) currently take place within or adjacent to two mesic (wet) areas, one of which was recently identified as meeting the criteria for a wetland (MT ARNG, 1996b). No development or change in activities is proposed as part of the action. The MT ARNG would continue to avoid the wetland area when conducting activities on the parcel. Any expanded use of the acquisition parcel into this wetland area would require a more detailed survey and coordination and mitigation with the Natural Resource Conservation Service. Spraying for noxious weeds in the upgradient portion of the wetland area should not be done by aerial application. Truck or backpack sprayers should be used for spot application as needed.

4.5.4 Potential Impacts of the Partial Acquisition Alternative

Impacts to biological resources from this action could be adverse if one or more landowners sold their parcel for commercial or residential development. Land development could impact winter range areas for the elk and mule deer. If the landowners continued to lease the land to the MT ARNG, impacts would be the same as those impacts from the Proposed Action. Noxious weed control would be implemented by the MT ARNG on acquired land, and private landowners would be responsible for weed control on their land. The area designated as a wetland by the Natural Resources Conservation Service would probably not be located within the acquisition area of this alternative. However, since no boundary lines have been drawn for this alternative, if the wetland was located within the acquisition parcel, private development of the area could result in a significant impact.

4.5.5 Potential Impacts of the No Action Alternative

If this alternative were implemented and the landowners continued to lease the land to the MT ARNG, impacts to biological resources would be the same as those impacts occurring from existing activities (see Section 4.5.2). If one or more of the landowners decided not to renew their lease and sold their land for commercial or residential development, impacts to biological resources would be adverse, particularly to winter range areas for the elk and mule deer. Private development of the area where the wetland currently exists could result in a significant impact.

4.5.6 Mitigations

No significant impacts to biological resources have been identified for current and planned military activities. The MT ARNG would continue to restrict training during wet periods to minimize impacts to vegetation. In addition, they would continue to rotate bivouac areas, land navigation courses, and dismounted infantry training to keep impacts to a minimum. Training activities would be constrained to occur outside of the wetland. Spraying for noxious weeds in the upgradient portion of the wetland should be conducted with truck or backpack sprayers. If the wet areas identified by the biological survey are to be disturbed in the future, the status and boundaries of the wetland area would need to be established by an approved wetland survey. Identification of the wet area that does not meet the definition of a wetland could also be determined.

4.6 CULTURAL RESOURCES

Cultural resources are limited, nonrenewable resources whose values may be easily diminished by physical disturbances. Existing activities such as foot and vehicular traffic, bivouacs, and helicopter flyovers do not impact cultural resources on Fort Harrison. There has not been any degradation of unique archeological resources or the destruction of structures listed or eligible for listing on the NRHP from existing activities at Fort Harrison. Implementation of the Proposed Action, Partial Acquisition Alternative, or No Action Alternative would not result in any significant impacts to cultural resources; therefore, impacts would be similar to those from existing activities.

The criteria used to determine the significance of impacts on cultural resources includes the effects on NRHP eligibility, future research potential, or suitability for religious or traditional uses. An impact could be significant if it resulted in the physical alteration, destruction, or loss of a resource listed or eligible for listing in the NRHP. An adverse impact would not be significant if only slight portions of the resource were affected or if the value of the resource was not very important. The impact of the action could be beneficial if it protected or reconstructed the resource.

4.6.1 Analysis Methods

To determine potential impacts, the analysis focused on the types of activities that would occur and the significance of the resource in that location. Previous NEPA documents and past archeological and historic resources surveys and plans were reviewed. A Phase I Archeological Survey was completed for the entire acquisition parcel. Appendix C of this EA includes a portion of the Survey Report (MT ARNG, 1996d).

4.6.2 Impacts of Existing Activities

Existing activities at Fort Harrison have an insignificant impact on cultural resources. Training activities on Fort Harrison do not involve construction or any excavation, grading, or soil compaction. The MT ARNG does regrade existing roads and add new gravel and has plans to add new culverts; however, this would not impact cultural resources. These construction activities would occur along previously disturbed areas. The MT ARNG has incorporated historic preservation planning into their Master Plan for future facility upgrades.

4.6.3 Potential Impacts of the Proposed Action

The Proposed Action would have an insignificant impact on cultural resources. Existing activities would continue with no development or construction proposed for the parcel. Existing roads would be regraded and new gravel and culverts added; however this would occur regardless if the MT ARNG purchases the parcel or continues their lease. The Phase I Archaeological Survey completed for the parcel did not identify any sites considered eligible for the NRHP. Section 3.6 and Appendix C of this document provide further information regarding historic isolated finds and sites within the parcel. A copy of the Draft Archaeological Survey was forwarded to the SHPO for their review and concurrence. The SHPO has reviewed and concurred with the Archaeological Survey (see Appendix A).

4.6.4 Potential Impacts of the Partial Acquisition Alternative

Impacts to cultural resources under the Partial Acquisition Alternative would be similar to those for the Proposed Action as long as the landowners continued to lease the land to the MT ARNG. If a landowner decided to sell the land for development, impacts to cultural resources could be adverse but continue to be insignificant because there are no sites considered eligible for the NRHP on the acquisition parcel (MT ARNG, 1996d).

4.6.5 Potential Impacts of the No Action Alternative

If this alternative were implemented, the acquisition parcel would remain undeveloped and current baseline conditions would continue until the current lease expires. If any of the landowners decided to sell the land and development occurred, impacts to cultural resources would be adverse but continue to be insignificant because there are no sites considered eligible for the NRHP on the acquisition parcel (MT ARNG, 1996d).

4.6.6 Mitigations

Disturbance of cultural resources not deemed eligible for the NRHP would adversely affect these resources but the impacts would be insignificant, in part because they were mitigated through documentation within the Phase I Survey Report. No significant impacts to cultural resources have been identified on Fort Harrison or on the proposed acquisition parcel; therefore, no mitigation measures are necessary.

4.7 NOISE

The Proposed Action of purchasing additional land parcels would not result in any increased aircraft or ground noise at Fort Harrison. Some existing operations would expand into the acquired parcel thus negligibly reducing noise levels outside the parcel. The effect of the Proposed Action would cause no impact to noise levels in the area. If development occurs under the Partial Acquisition Alternative, insignificant noise impacts would likely result. Potentially significant noise impacts could result if development occurs under the No Action Alternative.

The basis for determining the significance of the impacts is primarily the difference between the baseline noise environment and that of any changes. An appreciable increase in the background noise levels in the training areas (approximately 30 L_{dn} to 50 L_{dn}) would be perceived as an annoyance impact. Increases in time-average sound levels from ambient noise levels by more than 5 dBA would be clearly noticeable (changes in 3 dB are usually perceivable to the average person) and represent a significant adverse impact.

4.7.1 Analysis Methods

The analysis was based on the review of a number of sources: transportation and noise data; maps of the area; previous operations and small arms studies; and interviews with operations and range personnel. Single event noise levels from various activities and time-average noise levels were estimated for both baseline (discussed within Section 3.7) and compared to predicted changes in noise levels.

4.7.2 Impacts of Existing Activities

There are insignificant impacts to existing activities as they pertain to noise. The helicopter flights do not account for any significant noise in the Helena Regional Airport airspace and there are few noise complaints concerning the helicopters in and around the training areas. Most local people around the area are accustomed to seeing and hearing the helicopters flying so the annoyance level is minor. Based on noise complaints and knowledge of receptors in the training areas adjacent to Fort Harrison, pilots from the AASF establish flight paths that avoid potential problem areas. Helicopters flying at 1,000 feet above ground level generate SELs in the 85 to 90 dBA range. Noise from flights in the Fort Harrison training area do not significantly affect the environment.

Noise is generated from discharging weapons in the training area. As discussed in Section 3.7, compatibility zones have been established at the training areas based on noise levels. Development is limited based on the magnitude of noise within a zone. Complaints from adjacent property owners regarding use of the weapons ranges are negligible. Consequently, no significant noise impacts for use of the firing ranges has occurred.

Although noise from foot traffic and soldier communication in the training areas is negligible, noise is generated from operating vehicles (especially the M1 tank and Bradley M2A2) within the training areas. Operation of these heavy vehicles is performed primarily to move the vehicles to the thermal-sighting range and to transport soldiers for dismounted training. The maximum speed limits for all range roads and tank trails is 25 mph for wheeled vehicles and 15 mph for tracked vehicles unless otherwise designated. Noise generated in the training area during operation of these vehicles can range from approximately $35 L_{dn}$ to $55 L_{dn}$ for tracked vehicles, based on 10 vehicles per hour traveling at designated speeds with receptors at 500 feet lateral distance. Vehicle and soldier traffic occurs sporadically. Time-averaging of the noise results in levels similar to those of a rural road. Consequently, noise from traffic, individually or in combination with other noise generating activities, does not significantly affect the environment around Fort Harrison.

4.7.3 Potential Impacts of the Proposed Action

Since there are no plans to increase flight training, firing range, or vehicle activity, there are no adverse noise impacts based on implementing the Proposed Action. The use of the acquired parcel for bivouac training would negligibly increase the noise levels inside the parcel, and decrease the noise levels outside the parcel (bivouac activities would be transferred from another area on a rotating basis). The noise would be generated by soldiers walking and camping in the parcel.

4.7.4 Potential Impacts of the Partial Acquisition Alternative

If the portion of the leased property not acquired was not developed, the noise impacts would be insignificant and the same as those under existing operations (see Section 4.7.2). The eastern portion of the proposed parcel is planned to be acquired under this alternative. Consequently, if development occurred in the unacquired properties, the firing range noise zones II and III (discussed in Section 3.7.2.2) would be within the acquired parcel. Development in the unacquired parcel would be compatible with the existing noise levels. However, it is likely that

noise complaints would increase if the unacquired area was developed, especially if homes were constructed. The noise impacts would be considered as insignificant for this alternative.

4.7.5 Potential Impacts of the No Action Alternative

If the property continued to be leased under the same conditions as the existing leases, and no development occurred, the noise impacts would be insignificant and the same as those under existing operations (see Section 4.7.2). If development occurred in the unacquired properties, considerations would need to be made for land within noise zone II and noise zone III (approximately several acres). Development in zone III would be incompatible with the existing noise levels and is normally incompatible within zone II. If residential development occurred, noise complaints could increase substantially, potentially creating a significant impact.

4.7.6 Mitigations

Because there are no plans to increase training activities under the Proposed Action, and no adverse noise impacts have been identified, no mitigation measures are required. Under the No Action Alternative, it is recommended that Fort Harrison representatives work with local planners to minimize the potential for development occurring within an incompatible-designated noise zone.

4.8 SOCIOECONOMICS

Socioeconomic resources include elements such as employment, income, and population, which are considered within a specific ROI. Socioeconomic impacts of current activities at Fort Harrison are insignificant but beneficial. As a result of the Proposed Action, impacts to socioeconomic resources in the ROI (Lewis and Clark County) are predicted to be insignificant but beneficial. Implementation of the Partial Acquisition Alternative or the No Action Alternative could have insignificant adverse impacts on socioeconomic resources in the ROI, while adverse impacts to Fort Harrison's mission could occur.

Significance criteria for socioeconomic resources are determined by analyzing long-term fluctuation in elements such as employment and population within an ROI. This analysis allows a determination of the appropriate levels, or thresholds, beyond which changes in population or employment would noticeably affect individuals and communities within the ROI. Based on this methodology, a significant impact for the ROI, Lewis and Clark County, would be a change of more than 2.0 percent in projected employment or population. Generally, increases in employment and income are considered beneficial, unless those increases are accompanied by large, rapid population increases that overwhelm the capacity of the local housing market, schools, and government services.

4.8.1 Analysis Methods

Measures used for impact analysis include employment, income, building permit values, population, and local government revenue and taxation information. Lewis and Clark County, Montana, and United States employment and income data were obtained from the U.S. Bureau of Economic Analysis, the Montana Department of Commerce (Census and Economic Information Center), and the Montana Department of Labor and Industry (Research and Analysis Bureau).

Population data were obtained from the 1980 and 1990 U.S. Censuses and from the Montana Department of Commerce (Census and Economic Information Center). Information on personnel levels at Fort Harrison and the AASF was obtained from the Montana National Guard. Building permit data for the city of Helena were obtained from the City of Helena Building Department, while local government revenue and taxation information was received from the Lewis and Clark County Appraisal Office of the Montana Department of Revenue, Division of Property Assessment.

4.8.2 Impacts of Existing Activities

4.8.2.1 Employment and Income

Existing operations at Fort Harrison and the AASF include the employment of 235 full-time and 600 part-time Guard members and employees. The full-time employees represent less than 1 percent of the total employment of Lewis and Clark County. In addition to their Guard membership, most of the part-time Guard members, who constitute nearly 2 percent of Lewis and Clark County employees, have full-time jobs. Their National Guard membership allows these part-time personnel to supplement their income while contributing a valuable service to their country and community.

Most part-time Guard members are residents of the Helena area. However, most of the occasional users of Fort Harrison facilities come from outside of the area. Although these users are billeted at Fort Harrison during training operations, there are insignificant beneficial impacts to local retail establishments from these visitors.

4.8.2.2 Population

The 235 full-time Guard personnel at Fort Harrison and the AASF constitute approximately 1 to 1.5 percent of the total population of Lewis and Clark County, assuming an average of 2.5 dependents per Guard member. Since there is no post housing at Fort Harrison, these personnel live in communities near the fort, owning or renting homes and contributing to the tax base of the area. This constitutes an insignificant but beneficial impact to the ROI.

4.8.2.3 Environmental Justice

As noted in Section 3.8.3, Lewis and Clark County has a very small minority population, and less than 12 percent of the total population falls below the poverty level. There are no concentrations of minority or low-income persons located near Fort Harrison who are impacted differently than other population groups by activities at Fort Harrison.

4.8.2.4 Local Government Revenue

Current operations at Fort Harrison have only an indirect impact on local government revenues, in that part-time Guard membership increases the family income for those members. Some of this increase is likely to contribute to the purchase of more valuable homes, and thus to increased property tax payments. Although a beneficial impact, however, this is a very insignificant contribution to local revenues.

4.8.3 Potential Impacts of the Proposed Action

4.8.3.1 Employment and Income

No personnel changes or additional manning slots are expected to occur as a result of the Proposed Action. Therefore, there would be no expected impacts to employment.

The current landowners of parcels of property to be acquired would receive an economic benefit from payment for the land by the Federal government. Although the purchase price of the land would constitute only a minuscule portion of the total personal income for the county, the payment would constitute a beneficial impact to those persons and their communities, making these funds available for investment or spending.

4.8.3.2 Population

No personnel are expected to relocate to the Helena area as a result of the Proposed Action. Therefore, no impacts to population are projected.

4.8.3.3 Environmental Justice

The Proposed Action would not include any changes to existing operations or activities at Fort Harrison, and the property to be acquired would not be used any differently than it has been used for many years. Therefore, no environmental justice impacts would occur.

4.8.3.4 Local Government Revenue

The Proposed Action would remove the privately-owned property to be acquired under the Proposed Action from the county's property tax rolls, since ownership would pass to the Federal government. However, the Lewis and Clark County Appraisal Office of the Montana Department of Revenue estimates that property taxes on the privately-owned parcels are approximately \$400 to \$500 per year, less than 0.002 percent of total property tax revenues (MT Department of Revenue, 1996). This would be a negligible impact.

4.8.4 Potential Impacts of the Partial Acquisition Alternative

Impacts of the Partial Acquisition Alternative would be similar to those of the Proposed Action, except that there would be an even smaller beneficial impact related to the payment for the property (as discussed in Section 4.8.3.1). However, the cost of acquiring the remaining portion of land would increase with the passage of time, due to the population and economic growth that is occurring in the Helena area. Also, in the interim, development could occur on the unacquired portion of the property, rendering the property unusable for range activities. This would necessitate the acquisition of property at another location for range use, at considerably more cost to the government than the cost of the Proposed Action, and could also adversely affect Fort Harrison's mission in the future. If training and other range activities were reduced or moved to another location, there would be insignificant adverse impacts to the Helena area, since there would be fewer visitors to Fort Harrison.

4.8.5 Potential Impacts of the No Action Alternative

Under the No Action Alternative, impacts would be the same as those described in Section 4.8.2, as long as the property that is currently leased continued to be available for Fort Harrison's use. However, there is a high probability that one or more of the privately-owned parcels could be sold for development, due to the population and economic growth in the Helena valley, the spreading development approaching the acquisition parcel, rising land prices, and the low amount of the existing lease payment. Virtually any development would render the property unsuitable for range activities and would necessitate moving those activities to another location at considerable cost to the MT ARNG (see Section 2.4 and Section 4.8.4). If training and other range activities were reduced or moved to another location, there would be insignificant adverse impacts to the Helena area, since there would be fewer visitors to Fort Harrison.

4.8.6 Mitigations

No significant adverse impacts to socioeconomic resources are expected. Therefore, no mitigations are required.

4.9 LAND USE

Impacts to land use on Fort Harrison and adjacent properties from existing activities are insignificant. The Proposed Action would continue to restrict land use on the acquisition parcel because of safety fans but this is not considered to be a significant impact. The Proposed Action would not have a significant impact on land use. The Partial Acquisition Alternative and No Action Alternatives would have an insignificant impact on land use.

Potential impacts would be considered significant if adjacent land use or sensitive receptors were exposed to additional noise levels, if land values of adjacent properties were adversely affected, or if existing activities on adjacent properties were curtailed. Impacts would be considered insignificant if there is little or no change in the use or value of land adjacent to Fort Harrison as a result of the Proposed Action.

4.9.1 Analysis Methods

The assessment of potential impacts to land use focused on the various types of land use on Fort Harrison and in the adjacent properties. Previous NEPA documents and the Environmental Noise Study for Helicopter Stationing and Small Arms Noise were reviewed to provide data on land use restrictions. Land values were obtained from the Lewis and Clark County Appraisal Office of the Montana Department of Revenue, Property Assessment Division.

4.9.2 Impacts of Existing Activities

Existing activities do not impact land use on Fort Harrison. Land use on the proposed acquisition parcel is restricted because the safety fans for the firing ranges extend onto this land. As long as the Army leases this parcel, there cannot be any buildings, structures, or people present while the firing ranges are in use.

The Veterans Administration Hospital is considered a sensitive receptor but is not located within Zone III. As stated in Section 3.7.2.2, the Army has defined three noise zones to measure

impacts from Army activities on surrounding land uses. Zone I is compatible, Zone II is normally incompatible, and Zone III is incompatible. There are no other sensitive receptors in close proximity to Fort Harrison.

At the present time, no adverse impacts to the value of land adjacent to Fort Harrison have been identified.

4.9.3 Potential Impacts of the Proposed Action

The Proposed Action would not impact land use adjacent to Fort Harrison, but would ensure that land use (military operations) on Fort Harrison would remain the same. Land use on the acquisition parcel would continue to be restricted, in that building facilities or other structures would be prohibited as long as the safety fans from the firing ranges extend onto this property. Impacts to sensitive receptors would be the same as those for existing activities.

Because operations would be unchanged, no impact is expected to land values for adjacent property.

4.9.4 Potential Impacts of the Partial Acquisition Alternative

If this alternative is implemented and landowners continue to lease the land to the MT ARNG, impacts to land use, sensitive receptors, and land values would be the same as those from existing activities. However, if the landowners of the non-acquired property decided to sell their land for development, impacts to military land use would be the same as those described under the No Action Alternative (see Section 4.9.5, below).

4.9.5 Potential Impacts of the No Action Alternative

If this alternative is implemented, impacts to land use would be the same as those from existing activities as long as the landowners continue to lease their property to the MT ARNG. However, if the landowners decided to sell their land for development, there would be a significant impact to military land use (training operations). At least the M16 and M60 ranges, and possibly all of the firing ranges, would be shut down for safety reasons. This would create a significant impact to existing land use on Fort Harrison. Development could also impact the helicopter landing strips on Fort Harrison and cause training flights to be adjusted to avoid overflights of residences and may eventually cause them to be rerouted to other training locations. Shutdown of any ranges or the airstrip would cause noise levels on surrounding land uses to decrease for the short-term; however, depending on future use of the land, noise levels could increase in the long-term. Impacts to the value of adjacent land would also depend on the future use of the land that is currently leased by Fort Harrison.

Loss of the ranges at Fort Harrison would necessitate acquiring property elsewhere for range use. The cost of developing new ranges has been estimated at more than \$1 million per range, far in excess of the purchase price for the Proposed Action land acquisition. In addition, the loss of the ranges could also have an adverse, potentially significant, impact on Fort Harrison's mission in the future. The potential expenditure for range replacement, or loss of mission, would be a significant adverse impact to the MT ARNG.

4.9.6 Mitigations

If residences continue to be constructed on adjacent lands, helicopter flight paths to Fort Harrison and nearby training areas may need to be rerouted.

4.10 ENVIRONMENTAL PROGRAMS

The ongoing MT ARNG operations have minimal impacts on environmental programs identified in Section 3.10. Based on MT ARNG pollution prevention efforts, there may be lesser amounts of hazardous materials used or wastes (solid, hazardous, and water) generated as the training activities are continued; no significant impacts would occur from implementing the Proposed Action. Although identified IRP sites would not be affected by the Proposed Action, there is a potential for soil contamination on the acquisition property from past mining activities, and from target practice by the MT ARNG. No significant impacts are also projected for implementing either the Partial Acquisition Alternative or the No Action Alternative.

An impact would be significant if quantities of wastes generated were to exceed regulatory limits or existing disposal capabilities. There would also be a significant impact if workers or the general public were exposed to hazardous materials or wastes above health criteria levels. A beneficial impact would occur if hazardous material or various waste quantities are reduced or eliminated.

4.10.1 Analysis Methods

The assessment of potential impacts to environmental programs focused on MT ARNG operations, the use of hazardous materials, and the generation of wastes. Materials that could be used and the wastes that could be generated by the Proposed Action were identified, and considered for their potential to affect personnel handling or managing the materials or wastes. The location of IRP sites and potential IRP sites, and the potential for disturbing those sites, was also considered.

The analysis was performed using information obtained from interviews with MT ARNG personnel, and a review of relevant regulations, program documents, and associated data. Reference documents described material usage, waste generation, and plans or programs to manage and reduce the generation or handling of hazardous materials and various wastes.

4.10.2 Impacts of Existing Activities

Current MT ARNG activities are being properly managed under programs for hazardous materials, hazardous wastes, solid wastes, and wastewater. The IRP addresses sites that have resulted from past activities.

4.10.2.1 Hazardous Materials

Hazardous material use has been greatly reduced in recent years by the MT ARNG. An emphasis on material reduction and changed shop practices have lowered the number of types of hazardous materials from over 200 items to less than 70 items. Quantities used have also decreased by an average of 60 percent for all MT ARNG locations (MTDMA, 1995).

4.10.2.2 Hazardous Waste

Overall MT ARNG hazardous waste quantities have decreased by about 80 percent since 1993—the established baseline year. A 90-percent reduction from 1993 is projected for the end of 1996. The decrease has occurred as a result of implementing pollution prevention initiatives (MTDMA, 1995). For example, procedural changes have resulted in sump sludge being disposed of by landfarming, and fuels being removed from the waste stream by blending and using fuels in the MT ARNG energy recovery program. New equipment, such as filtration and hot water parts washers, are reducing waste quantities. Finally, the use of substitute products, such as rechargeable batteries, are also reducing the amount of hazardous waste generated.

These changes have reduced the impact of changing or new operations as well as existing operations. The small quantities of waste that are generated by the MT ARNG (e.g., from maintenance of vehicles or cleaning of equipment) would be reduced. Because little waste is generated from the activities (i.e., Fort Harrison is a small quantity generator, and the training areas are very small contributors), there are no significant issues associated with the current hazardous waste program.

4.10.2.3 Installation Restoration Program

The six IRP sites that have been identified are located away from the training areas. Activities that could disturb the sites are identified before those activities (e.g., trenching) are initiated, and the sites are not disturbed. Further consideration of the sites is ongoing, and the sites will be closed or further investigated as appropriate. The IRP program is not impacted by existing activities.

There is also a potential for lead contamination of soils throughout much of the acquisition parcel, although specific IRP sites related to lead contamination have not been identified. This potential contamination is the result of several decades use of part of the area for target practice and from stray rounds from other nearby areas. The potential for lead to leach into surface water has been addressed by the MT ARNG. The MT ARNG has taken four water samples from surface water drainage in the training area. These samples were analyzed for metal contaminants, including lead; no metal contaminants were detected above regulatory limits (Martinka, 1996). Lead is found in large pieces and is not likely to be mobilized in the dry conditions at the acquisition parcel.

There may also be UXO located throughout the parcel. While residual amounts of various UXO constituents can also exceed regulatory standards, a more obvious and likely hazard is the potential for intact rounds to be located within the parcel.

4.10.2.4 Solid Waste

The amount of solid waste generated at the training area is not significant. Wastes that are generated (e.g., packing material, food wrapping) is brought back to Fort Harrison and disposed of with other solid waste. The disposal of solid waste at Fort Harrison is not restricted, and ongoing reduction and recycling programs are likely to further reduce solid waste generation in the future.

4.10.2.5 Wastewater

Wastewater treatment would not be affected by the use of training areas. The same number of personnel would continue to train at the currently leased property. Wastewater discharge to the Veterans Administration lagoons would continue at the current rate.

4.10.3 Potential Impacts of the Proposed Action

The Proposed Action would not impact the current MT ARNG management or disposal of wastes. No major maintenance is associated with the action, and no additional waste generation or changes in waste handling would occur.

The types and amounts of materials currently used are not likely to change significantly, although the emphasis on the reduction of hazardous material use will continue. There may be some additional fuels used for a generator or other small pieces of equipment, but the amounts would be very small (e.g., a five gallon fuel capacity for a generator).

As noted in Section 4.10.2.3, there is a potential for lead contamination of soils on the acquisition parcel. It is also likely that UXO is present on the parcel. While the overall impact of these contaminants would be unchanged under the Proposed Action, the risks related to the potential contamination would be lessened by the purchase of the property, since long-term access to the property would be controlled by the MT ARNG.

There are numerous historic mining sites scattered throughout the acquisition area, which may have resulted in soil contamination. Arsenic is a likely contaminant, because naturally-occurring levels of arsenic are high. However, most mining sites are generally small, shallow prospect pits, with little surface soil found at the sites (MT ARNG, 1996d). There are eight mine shafts on the acquisition property. The ground surface in the vicinity of the mining activities is dry, and therefore there is a low potential for contamination (i.e., minimal leaching potential).

4.10.4 Potential Impacts of the Partial Acquisition Alternative

If only a portion of the range area were to be purchased and no future private development of the unacquired parcel occurred, the impact would be the same as if the entire parcel were purchased; that is, there would be no significant impact. The same activities and management of materials and waste generation would occur. If development occurred within the unacquired properties, the M16 and M60 ranges could not be operated. A lesser use of hazardous materials and a decrease in waste generation would occur. The changes would not be significant since few materials are used and little waste is currently generated.

Any plan for development of the unacquired properties would need to consider the possibility of encountering UXO and spent munitions with high lead levels.

4.10.5 Potential Impacts of the No Action Alternative

If no action is taken and the land continued to be leased under the same conditions as the current lease, the MT ARNG management and disposal of materials or wastes would be unchanged from existing methods. No additional material uses or waste generation or changes in waste handling would occur. No significant impact would occur under this scenario. If development occurred within the unacquired properties, the M16 and M60 ranges could not be operated. A lesser use of

hazardous materials and a decrease in waste generation would occur. The changes would not be significant since few materials are used and little waste is currently generated.

Any plan for development of the unacquired properties would need to consider the possibility of encountering UXO and spent munitions with high lead levels.

4.10.6 Mitigations

Adverse effects in most environmental programs are best addressed through pollution prevention initiatives. Although these initiatives are not mandatory mitigative measures, the MT ARNG has a robust ongoing pollution prevention program, and continuing efforts to reduce or eliminate the use of hazardous materials and waste generation should be pursued.

To ensure that no contaminants are being released or will be released from old mining sites, a review of the mining sites located on the acquisition parcel should be conducted. Small, shallow surface mines are unlikely to pose contamination problems; the condition of the mine shafts should be reviewed more closely. Mitigation of some sites (e.g., by closing open mine shafts) may be needed as a result of the review.

Although lead is not likely to be mobilized in the dry conditions at the acquisition parcel (and because the lead is found in large pieces), a study of the area with respect to lead contamination should be conducted. A review of the potential hazards from UXO on the acquisition parcel should also be conducted.

4.11 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS

The Proposed Action would be compatible with existing Federal, state, and local land use plans, policies, and controls. The action would also be consistent with current Fort Harrison activities.

4.12 RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

In general, several activities could result in short-term resource uses that compromise long-term productivity. Examples include the filling of wetlands or loss of other especially important habitats, or conversion of elk wintering areas to commercial or residential development. At the present time, none of these activities have been identified for the Proposed Action or the Partial Acquisition Alternative. The amount of grazing currently occurring on the leased parcels would probably remain the same with the Proposed Action. Consequently, long-term productivity of the land would not be affected.

4.13 CUMULATIVE IMPACTS

The following subsections discuss unavoidable and cumulative impacts as a result of implementing the Proposed Action, Partial Acquisition Alternative, or No Action Alternative. Cumulatively significant impacts are those that when considered individually may be insignificant, but in aggregate or from interactions of effects on different resources, would create a significant impact.

For this analysis, no cumulatively significant impacts are projected to occur. Fort Harrison has additional capacity to expand its mission without significantly affecting the environment.

4.13.1 Operations and Safety

Flying, range firing, and field training exercises will continue at approximately the same levels, regardless of whether the Proposed Action is implemented. Ongoing impacts (i.e., rare accidents), from these missions are unavoidable. No new missions or activities are planned to be introduced at Fort Harrison and its adjacent training area. Acquisition of the parcel would be beneficial for the safety program and would not impact operations. With no mission changes associated with other actions, there would be no significant, cumulative impacts to operations and safety. If land within the proposed acquisition parcel were developed privately—a potential scenario that could occur under the Partial Acquisition and No Action Alternatives—insignificant impacts to operations and safety are projected to occur. Thus, no significant cumulative impacts would occur.

4.13.2 Air Quality

There would be unavoidable air emissions from the operation of helicopters and other equipment, including personal vehicles, but these emissions would be minimal. The emissions would be cumulative with other ongoing activities in the area, but would not affect the attainment status of the Fort Harrison area or the current non-attainment area located near the airport. Even if private development occurred under the Partial Acquisition Alternative or No Action Alternative, cumulative air quality impacts are not predicted to be significant.

4.13.3 Geologic Resources

Under the Proposed Action, mineral rights would be acquired for areas that were prospected for gold in the past, and private mining could no longer occur in these areas. This would have an unavoidable, but insignificant impact on the mining economy of the area.

Insignificant, unavoidable impacts to soils would occur from construction projects at Fort Harrison (none within the proposed acquisition area) over the next ten years. Because these projects would occur over different timeframes and in different areas, no cumulative impacts are anticipated. If private development occurred under the Partial Acquisition Alternative or No Action Alternative, potentially significant impacts to soils could occur. However, these impacts would not cause cumulatively significant soil impacts in conjunction with other activities occurring at different times and different locations.

No cumulatively significant impacts would occur regarding the geology, physiography, and seismicity of the area around and including Fort Harrison.

4.13.4 Water Resources

No unavoidable or significant cumulative impacts are predicted for the Proposed Action or if leases are continued under the Partial Acquisition or No Action Alternatives. If private development occurs, an unavoidable impact to water use would occur; however, no significant cumulative impacts to water resources are projected to occur.

4.13.5 Biological Resources

No unavoidable or significant cumulative impacts would occur under the Proposed Action. If private development occurred under the Partial Acquisition or No Action Alternatives, disturbance of vegetation and displacement of wildlife would be unavoidable. If private development occurred in the wetland within the proposed acquisition parcel, significant impacts could occur. However, these impacts would not cause cumulatively significant impacts.

4.13.6 Cultural Resources

There is little likelihood of affecting previously unknown or undisturbed resources. Thus, no unavoidable impact has been identified. No cumulative effects of activities for the Proposed Action, when considered with other ongoing and planned actions, would significantly impact cultural resources at Fort Harrison. Under the Partial Acquisition or No Action Alternatives, private development could occur in the parcel proposed for purchase. However, an archaeological survey was performed that documented sites and artifacts not eligible for the NRHP. Even if these areas were disturbed, the documentation provides sufficient information so no significant impact would occur per incident, or cumulatively.

4.13.7 Noise

No noise impacts to the environment would occur from implementing the Proposed Action. Noise generated by helicopter flights, firing of weapons, and vehicle traffic, which would occur at the same rate and frequency under the Proposed Action or continuation of the existing lease arrangement, is unavoidable. Consequently, no cumulatively significant impacts would occur for the Proposed Action. Under the Partial Acquisition Alternative or No Action Alternative, no significant cumulative noise impacts are projected to occur; a significant impact could occur from impingement of private development on an incompatible-designated land use zone, but this would not be cumulatively significant.

4.13.8 Socioeconomic Resources

No unavoidable impacts are predicted to occur. Construction is planned to occur at Fort Harrison for future projects, as evaluated in the Fort Harrison Master Plan (MT ARNG, 1996). Based on the level of activity projected to occur, no cumulatively significant socioeconomic impacts are likely. If private development occurred under the Partial Acquisition Alternative or the No Action Alternative, the mission of Fort Harrison could be significantly impacted. The proportion of Fort Harrison's contribution to the local economy is not significant. Therefore, no cumulatively significant impact to socioeconomic resources in the ROI would occur as a result of private development within the proposed parcel.

4.13.9 Land Use

Under the Proposed Action, property that has been leased would be purchased from private landowners or transferred from the BLM. This property would then be unavailable for residential or commercial development. This would have an unavoidable, but insignificant impact on the land use of the area. If private development occurred under the Partial Acquisition Alternative or the No Action Alternative, the mission of Fort Harrison could be significantly impacted. However,

the amount of land affected is minor relative to the total amount of available land in the area. Therefore, no cumulatively significant impact to land use would occur as a result of private development within the proposed parcel.

4.13.10 Environmental Programs

Implementing the Proposed Action would not change the type and amount of activities that occur within the Fort Harrison training area. Although unavoidable impacts of waste generation (solid, hazardous, and wastewater) and hazardous material usage would continue to occur under these existing activities, no new unavoidable impacts would result from implementing the Proposed Action. No cumulatively significant impacts to environmental programs are projected to occur under the Proposed Action or either alternative. The proposed acquisition parcel contains expended munitions (with high lead levels) and UXO. Under the Partial Acquisition Alternative and the No Action Alternative, a portion of the subject land could be privately developed. Although not cumulatively significant, potential contamination of the site would need to be evaluated prior to development.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The irreversible and irretrievable commitment of resources typically includes the use of materials and energy for construction of facilities, as well as dedication of land to support activities. Materials and energy for development would be irretrievably committed. At the present time, no construction is planned under the Proposed Action. Acquiring the land would constitute an irreversible commitment (at least in the short-term) of land withdrawn from private development (e.g., industrial, residential, or mining use). If the mission of Fort Harrison changes, the parcel could be resold. Under the Partial Acquisition or No Action Alternatives, private development of the subject parcel could occur; in this situation, resources for private development could be irretrievably committed.

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CHAPTER 5
BIBLIOGRAPHY

5 BIBLIOGRAPHY

- City of Helena Building Department. 1996. Building permit data.
- City of Helena. 1996. Helena Home Page, Helena Climate and Topography (Image Plaza); Climate and Topography - Helena, MT. June 6.
- Federal Interagency Committee for Wetland Delineation, 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service. Washington D.C.
- Ferguson, Maxine, Family/Maternal and Child Health Bureau, Montana Department of Health and Environmental Science. 1993. Personal communication. July.
- Gil, Bud, U.S. Army Safety Center. 1996. FAX communication on aircraft safety. July.
- Helena Area Chamber of Commerce. 1996. *Helena, Montana: A Business Portfolio*.
- International Conference of Building Officials. 1991. Seismic Zone Map of the United States. In Seismic Design for Buildings. Departments of the Army, the Navy, and the Air Force.
- Luz, G.A. 1982. "An Improved Procedure for Evaluating the Annoyance of Small Arms Ranges," presented at the 104th Meeting of the Acoustical Society of America, Orlando, Florida. November.
- Linconbock, Debbie, Montana Department of Environmental Quality. 1996. Personal communication regarding air quality. June.
- Martinka, Major Steve, MT ARNG. 1996. Personal communications regarding various activities at Fort Harrison. June, July.
- Mercer, Ron, Helena Regional Airport Authority. 1996. Personal communication. July.
- Montana Army National Guard. 1992. Record of Environmental Consideration for Fort Harrison Expansion Area. June.
- Montana Army National Guard. 1993. Montana Sediment and Erosion Control Manual. May.
- Montana Army National Guard. 1994. Cultural Resource Management Report (Draft) for Fort William Henry Harrison. November.
- Montana Army National Guard. 1995. Final Environmental Assessment, Montana Army National Guard, Helicopter Conversion, Helena Regional Airport. February.

- Montana Army National Guard. 1995a. Final Environmental Assessment, Montana Army National Guard Fort Harrison Land Exchange. July.
- Montana Army National Guard. 1995b. Memorandum for Training Site. Use of BLM Lands, Granite Creek Area. August.
- Montana Army National Guard. 1995c. Training Site. Information Packet for Fort William Henry Harrison. October.
- Montana Army National Guard. 1995d. Major Land Acquisition Proposal, Fort William Henry Harrison, Helena, Montana. November.
- Montana Army National Guard. 1995e. Pollution Prevention Environmental Award Submittal, Helena, MT.
- Montana Army National Guard. 1996. Master Plan, Fort William Henry Harrison. January.
- Montana Army National Guard. 1996a. Fort William Henry Harrison/Limestone Hills Montana. 1996a. Land-Use Requirements Study. March.
- Montana Army National Guard. 1996b. Preliminary Draft Biological Survey for the Fort William H. Harrison Expansion Area, Lewis and Clark County, Montana. July.
- Montana Army National Guard. 1996c. Background Contexts and Records Search: Fort Harrison Expansion Area 1996. June.
- Montana Army National Guard. 1996d. Preliminary Draft Phase I Archaeological Survey. July.
- Montana Army National Guard. 1996e. State-wide Air Pollution Emissions Inventory, Montana Army National Guard, Helena, Montana. January.
- Montana Army National Guard, undated. Montana Army National Guard P2 Program, An Integrated Approach, ECAS/Hazardous Waste Mgr., Helena, MT.
- Montana Department of Commerce, Census and Economic Information Center. 1996. Population data.
- Montana Department of Labor and Industry, Research and Analysis Bureau. 1996. Employment and unemployment data.
- Montana Department of Military Affairs. 1993. DMAMT Regulation 200-1, Hazardous Waste Program, Helena, MT. January 25.
- Montana Department of Military Affairs. 1995. DMAMT Regulation 200-8, Pollution Prevention Program, Helena, MT. August 15.

Montana Department of Military Affairs. Montana Army National Guard. 1995a. Montana Army National Guard Environmental Programs, Helena, MT. November.

MT—*see* Montana.

MT ARNG—*see* Montana Army National Guard

MTDMA—*see* Montana Department of Military Affairs

Nunn, Ernie, Helena Area Chamber of Commerce. 1996. Personal communication.

Porter, Karen, Montana Bureau of Mines and Geology. 1996. Personal communication. July.

PRC Environmental Management, Inc. 1995. Draft Site Inspection Summary Report, Helena, MT. December.

Rahn, Joe, CW2, MT ARNG AASF, Operations. 1996. Personal communication. June.

Schaan, Tony, SFC, Training Site Operations. 1996. Personal communication. July.

Schock, Swede, Montana Department of Revenue, Division of Property Assessment, Lewis and Clark County Appraisal Office. 1996. Personal communication. July.

USA—*see* U.S. Army

U.S. Army. 1992. Environmental Noise Study Number 52-34-QT49-92, Helicopter Stationing and Small Arms Noise, Montana Army National Guard. U.S. Army Environmental Hygiene Agency. September.

U.S. Army. 1993. Memorandum for Commander, Arizona Army National Guard on the Subject of Helicopter Air Emissions Data. U. S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland. June.

U.S. Bureau of Economic Analysis, 1996. Economic data.

U.S. Bureau of the Census. 1990. Census of Population and Housing. Population data (1990 and previous).

U.S. Bureau of the Census. 1996. Population Estimates. Population data (1991-1995).

U.S. Department of Agriculture. Undated. Interim Soil Survey of Helena Valley, Lewis and Clark County, Montana.

U.S. Department of the Interior. 1983. Headwaters Resource Area Resource Management Plan Final Environmental Impact Statement. November.

U.S. Environmental Protection Agency. 1993. Aerometric Information Retrieval System (AIRS). September.

U.S. Environmental Protection Agency. 1995. AP-42, Fifth Edition, Office of Air Quality Planning and Standards, January.

USGS—*see* U.S. Geological Survey

U.S. Geological Survey, 1985. 7.5 Minute Quadrangles of Austin, Black Mountain, Helena, and Scratchgravel Hills.

U.S. Geological Survey, 1986. Geology, Earthquake Hazards, and Land Use in the Helena Area, Montana – A Review. USGS Professional Paper 1316.

U.S. Geological Survey, 1992. Hydrogeology of Helena Valley-Fill Aquifer System, West Central Montana. Water Resources Investigations Report 92-4023, Helena, MT. April.

U.S. Geological Survey, 1994. Geology of the Elliston Region, Powell and Lewis and Clark Counties, Montana. USGS Bulletin 2045.

CHAPTER 6
LIST OF PREPARERS

6 LIST OF PREPARERS

This environmental assessment has been prepared by the Montana Army National Guard with contractual assistance from LABAT-ANDERSON INCORPORATED. Contributors to the document are listed alphabetically and identified by name, organization, education, and experience:

Robert E. Black, LABAT-ANDERSON INCORPORATED: Senior Reviewer
B.S., 1962, Mathematics, Montana State College, Bozeman
B.S., 1963, Meteorology, University of Utah, Salt Lake City
M.S., 1968, Atmospheric Sciences, Colorado State University, Ft. Collins
Years of Experience: 34

Lisa A. Briggs, LABAT-ANDERSON INCORPORATED: Administrative Assistant
A.A., Secretarial Science, Metropolitan Community College, Omaha, Nebraska
Years of Experience: 5

David M. Ferguson, GCM Services Incorporated: Archaeologist/Project Manager
B.S., 1989, Psychology, University of Montana (Missoula)
M.A., 1993, Anthropology, University of Montana (Missoula)
Years of Experience: 8

Brian G. Goss, LABAT-ANDERSON INCORPORATED: Project Manager
B.A., 1979, Geology, Franklin and Marshall, Lancaster, Pennsylvania
M.S., 1983, Geochemistry, The Pennsylvania State University, State College
Years of Experience: 11

Carmen L. Hansen, LABAT-ANDERSON INCORPORATED: Administrative Assistant
Years of Experience: 8

Albert L. Harting, Harting Wildlife Consulting: Consulting Wildlife Biologist
B.S., 1976, Zoology, University of Texas (Austin)
M.S., 1985, Biological Science, Montana State University (Bozeman)
Years of Experience: 20

**Niles V. Jokela, LABAT-ANDERSON INCORPORATED: Air Resources; Water Resources;
Environmental Programs**
B.A., 1979, Biology, Concordia College, Moorhead, Minnesota
M.S., 1993, Environmental Science, University of Colorado, Denver
Years of Experience: 12

Randall G. McCart, LABAT-ANDERSON INCORPORATED: Geological Resources
B.S., 1981, Geography, University of Nebraska at Omaha
M.A., 1984, Geography, University of Nebraska at Omaha
B.S., 1987, Education, University of Nebraska at Omaha
Years of Experience: 9

Joseph E. Milligan, Ph.D., Director of Environmental Research, LABAT-ANDERSON
INCORPORATED: Senior Reviewer
B.S., 1963, Agriculture, Rutgers University, New Brunswick, NJ
M.S., 1975, Animal Science, Rutgers University
D.V.M., 1979, Veterinary Medicine, Cornell University, Ithaca, NY
Ph.D., 1979, Nutrition/Physiology, Rutgers University
Years of Experience: 33

William K. Ohlmeyer, LABAT-ANDERSON INCORPORATED: Aircraft Operations; Noise
B.S., 1970, Architectural Construction, Texas A&M University, College Station
M.Arch., 1971, Construction Management, Texas A&M University
Years of Experience: 22

Sheri A. Rivera, LABAT-ANDERSON INCORPORATED: Biological Resources; Cultural
Resources; Land Use
B.S., 1989, Geography, University of Nebraska at Omaha
M.S., 1995, Urban Studies, University of Nebraska at Omaha
Years of Experience: 9

Kristin L. Sutherlin, LABAT-ANDERSON INCORPORATED: Socioeconomics;
Land Use
B.A., 1986, Economics, Louisiana State University in Shreveport
M.A., 1988, Urban Studies (Planning), University of Maryland, College Park
Years of Experience: 10

APPENDIX A
AGENCY CORRESPONDENCE

APPENDIX A

This appendix contains a copy of the IICEP letter and a list of agencies who received the letter. It also contains a copy of the comment letters received on the DOPAA, with each letter followed by the MT ARNG response to that letter.

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DEPARTMENT OF MILITARY AFFAIRS



MARC RACICOT, GOVERNOR

P.O. BOX 4789

STATE OF MONTANA

OFFICE OF THE ADJUTANT GENERAL
(406) 444-6910

HELENA MONTANA 59604-4789

July 12, 1996

(To Individuals on IICEP Mailing List)

Dear Sir/Madam:

The Montana Army National Guard (MT ARNG) is proposing to purchase 897 acres of land located west of Fort William Henry Harrison, Helena Montana. In addition, they are proposing to withdraw 100 acres of Bureau of Land Management (BLM) land in this same area. According to the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA), the MT ARNG must assess the potential environmental impacts of the proposed action and alternative. The MT ARNG has contracted LABAT-ANDERSON INCORPORATED to prepare an environmental assessment to analyze any potential impacts from the proposed land purchase.

In accordance with Executive Order 12372, Intergovernmental Review of Federal Programs, the MT ARNG is requesting input from other federal, state, and local agencies on the proposal. A Description of the Proposed Action and Alternatives (DOPAA) is attached for your review and comment. Please identify any resources within your purview that may be potentially impacted. Maps with project information are included in the DOPAA to assist your office in reviewing the proposal.

Please provide any comments or information within 30 days of receipt of this letter. Responses may be sent to:

LABAT-ANDERSON INCORPORATED
Attn: MT ARNG Team
1406 Fort Crook Road South, Suite 101
Bellevue, Nebraska 68005

Your assistance in providing information is greatly appreciated. Questions may be directed to Major Steve Martinka of the MT ARNG at (406) 439-2619, or to Brian Goss or Sheri Rivera of LABAT-ANDERSON INCORPORATED at (402) 291-2362.

Sincerely,

John B. Wheeler
Environmental Program Manager
Department of Military Affairs

Attachments

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IICEP MAILING LIST

Department of Agriculture
Environmental Management Division
Agriculture and Livestock Building
Capitol Station
P.O. Box 200201
Helena, Montana 59620-0201

Department of Natural Resources & Conservation
Mr. Art Compton
1625 11th Avenue
Helena, Montana 59601

Montana Dept. of Fish, Wildlife, & Parks
1420 East 6th Avenue
Helena, Montana 59620-0201

Department of Health & Environmental Sciences
Ms. Jan Senibaugh
Air Quality Division
1520 E Sixth Avenue
Helena, Montana 59620-0201

Dept. of Health & Environmental Sciences
Frederick C. Shewman, PhD
Water Quality Division
Cogswell Building, Room A206
Helena, Montana 59620-0201

Helena Regional Airport
Airport Authority
2850 Skyway Drive
Helena, Montana 59601

State Historic Preservation Officer
Mr. Stan Wilmot
1410 8th Avenue
Helena, Montana 59601

Environmental Protection Agency
Region VIII
999 - 18th Street
Denver, Colorado 80202-2405

U.S. Fish & Wildlife Service
Region 6, Denver Regional Office
P.O. Box 25486
Denver, Colorado 80225

Bureau of Land Management
Granite Tower Building
222 N. 32nd Street
Billings, Montana 59101

Bureau of Land Management
Headwaters Resource Area
106 North Parkmont
P.O. Box 3388
Butte, Montana 59702-3388

Montana Historical Society

Historic Preservation Office

1410 8th Avenue • PO Box 201202 • Helena, MT 59620-1202 • (406) 444-7715 • FAX (406) 444-6575

July 26, 1996

LABAT-ANDERSON, INC.

Attn: MT ARNG Team

1406 Fort Crook Road South, Suite 101

Bellevue, NE 68005

RE: Cultural Resource File Search - Fort William Henry Harrison, MT: LC Co.

Ladies/Gentlemen:

Enclosed please find a list of recorded resources within the general project area. I have also included a computer code guide for interpretation of site types and other codes. If you need more information on recorded sites, you can contact the University of Montana's Archaeological Records Office, as they maintain originals of the site forms and can make copies. The last enclosure is bibliographic information on previous cultural resource inventory surveys that have been completed in the general project area. These reports are all available in this office.

Because the exact legal location(s) of the project and a 7½-minute USGS map were not provided with the correspondence of July 12, it is difficult to determine if any historic or prehistoric resources may be impacted by the land acquisition. We recommend that a cultural resource inventory survey be conducted if ground-disturbing activities in the project area are planned to identify recorded sites and other unknown/unrecorded resources that may be jeopardized by the project. We anticipate consultation by your office to identify the appropriate inventory strategies for this project.

Thank you for the opportunity to comment, and please feel free to contact this office if you need further assistance.

Sincerely,



Kimberly Morrison

Interim Cultural Records Manager

Encls.

FILE: MT Dept. Mil. Afrs.

Montana Historical Society

Letter acknowledged. An Archaeological Phase I Survey was conducted for this Proposed Action as described in Section 3.6. A copy of the draft survey has been forwarded to the State Historic Preservation Office for review and comment.



MARC RACICOT
GOVERNOR

MONTANA DEPARTMENT OF AGRICULTURE

AGRICULTURAL SCIENCES DIVISION
303 N ROBERTS, PO BOX 200201
HELENA, MT 59620-0201

W. RALPH PECK
DIRECTOR
(406) 444-3144

FAX (406) 444-5409
TDD (406) 444-4687

GARY GINGERY
ADMINISTRATOR
(406) 444-2944

July 19, 1996

Labat-Anderson Incorporated
Att: MT ARNG Team
1406 Fort Crook Road South, Suite 101
Bellevue, Nebraska 68005

RECEIVED JUL 25 1996

Dear Sir/Madam:

Upon review of the Description of Proposed Action and Alternatives submitted to the Montana Department of Agriculture by the Department of Military Affairs, it was noted that no discussion was made concerning noxious weed management activities.

Noxious weeds threaten the biodiversity of the state. The 1995 Montana Legislature recognized this and enacted HB 395 to address weed management plans on state owned land.

HB 395 provides for the development of a six year noxious weed management plan on all land owned by the state of Montana. In addition to the development of the cooperative noxious weed management plan, the legislation mandated that a biennial performance report be sent to the Department of Agriculture. The performance report for this biennium is due to the Department by November 15, 1996. The development of the noxious weed management plan and the biennial performance report should be a cooperative effort between the state agency and the county weed district in which the land lies.

Please find enclosed for your review HB 395 as passed by legislature, an example of a noxious weed management plan, and a biennial performance report for noxious weed activities.

If you have questions regarding this matter, please contact me at 406-444-2944.

Sincerely,

Harold Stepper, Weed Coordinator

cc: John B. Wheeler

Enclosures

Montana Department of Agriculture

Letter acknowledged. Information has been incorporated (see Sections 3.5.2, 4.5.2.2, 4.5.3.2, 4.5.4, and 4.5.6; Executive Summary, Chapter 2) concerning noxious weeds. The MT ARNG recognizes the need for a noxious weed management plan and has began initial steps to prepare this plan. This initiative will be accomplished by the MT ARNG under a separate action and not within this EA.

State Historic Preservation Office

Montana Historical Society

1410 8th Avenue • PO Box 201202 • Helena, MT 59620-1202 • (406) 444-7715

DMA

SEP 09 1996

ENVIRONMENTAL PROGRAM

September 6, 1996

John B. Wheeler, J.D.
Environmental Program Manager
Montana Army National Guard
P.O. Box 4789
Helena, MT 59604-4789

Re: Land Exchange at Fort Harrison, L&C Co.

Dear John:

Thank you for allowing us to review the work done by LABAT-ANDERSON INCORPORATED. We Concur with their findings. We do this with the assumption that your office has concurred with their findings. Attached is a copy of our DRAFT Guidelines and Procedures. This is only a Draft but may assist you in your dealings with this office. The last page is a sample letter that would allow us to stamp CONCUR (if in fact we do concur) and rush the projects along.

Sincerely,

Josef J. Warbark, Historian
Historical Survey Reviewer

File: DOA/Ft. Harrison/LC Co.

Incl. Consulting With the Montana SHPO: Draft

cc: BLM Butte

Montana Historic Preservation Office

Letter acknowledged.

Environmental Protection Agency

LABAT received a telephone call from Mr. Mike Streiby of the EPA Regional Office in Denver stating that he had no comments on the DOPAA that was sent to him as part of the IICEP process. Mr. Steve Potts from the Helena EPA also had no comments on the DOPAA.

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APPENDIX B
BIOLOGICAL SURVEY

**Biological Inventory
for the
Fort William H. Harrison Expansion Area
(Lewis and Clark County, Montana)**

**Prepared for Labat-Anderson Incorporated
by
Harting Wildlife Consulting
(28 July 1996)**

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**Biological Inventory for the Fort William H. Harrison Expansion Area
(Lewis and Clark County, Montana)**
28 July 1996

I. Abstract

A biological inventory was completed for a proposed Montana Army National Guard acquisition site in west-central Montana. The area surveyed covers approximately 997 acres three miles west of Helena, Montana. Methods included direct observation; surveys of suitable habitats for listed, rare or sensitive plant or animal species; and consultation with agency biologists. Fieldwork was conducted in May and July 1996.

No listed, rare or sensitive species were found on the survey area. Aerial survey and telemetry data indicated that the western portion of the area was seasonally important winter range for elk. Observations of elk sign indicated that the survey area also received moderate use during spring/early summer. Mule deer are commonly found on the area throughout the year and it serves as important winter range for 200-300 deer. The complex topography on the western and southwestern part of the survey area may serve to effectively isolate ungulates using these areas from disturbance (military activities) occurring in the lower elevation, eastern segment. Additionally, most of the activities planned for the area will occur in summer, after animals have dispersed to summer ranges.

Vegetation found on the area is representative of common grassland associations in west-central Montana. Two stands of mature conifers are found on the area with larger conifer stands on adjacent lands immediately west of the site. Two stands of mature deciduous trees are also located on the site, both of which serve as focal areas for wildlife. These two areas were examined to determine if they met the criteria for wetland determination; one of the two areas successfully met the criteria and received provisional wetland designation by the Natural Resource Conservation Service (NRCS). No construction or other surface disturbing activities are scheduled and hence the wetland characteristics of this area should not be affected by the acquisition. Any major disturbance which would disrupt the hydrologic characteristics of either area such as drainage, dredging or filling would necessitate a more detailed survey and further consultation with the NRCS.

No significant impacts to plant or animal species occurring on the survey area are anticipated to result from the land acquisition or proposed military activities. It is recommended, however, that should the timing of military activities be changed to include late winter/spring exercises: 1) the area should be surveyed for sharp-tailed grouse lekking activity and 2) state ungulate biologists should be consulted to determine if elk and deer wintering on the area have dispersed to spring/summer ranges.

II. Need for the Biological Inventory

The Montana Army National Guard (ARNG) seeks to consolidate federal land holdings in the area west of Fort William Henry Harrison through a land acquisition. The objective is to ensure that existing training areas and small arms ranges with safety fans remain usable as the dominant land use on surrounding lands shifts from agriculture to suburban residential development. The lands surveyed for this biological inventory are currently leased for use by the ARNG from private landowners under provisions of a 5-year, annually renewable agreement. Future use of the proposed acquisition area will not change from the current use and no construction is planned for the acquisition area.

Prior to completing a federal land purchase, compliance with all provisions of the National Environmental Policy Act must be assured through preparation of an Environmental Assessment (EA). Information developed for this biological inventory will be incorporated into an EA to evaluate the likelihood of significant impacts resulting from the planned action. Should the EA indicate that significant impacts may result, a subsequent Environmental Impact Statement (EIS) will be prepared.

III. Study Area

The study area lies immediately west of Fort William Henry Harrison, approximately 3 miles west of Helena, Montana (Appendix B: Map 1). The area inventoried for this biological inventory includes approximately 997 acres encompassing portions of Sections 16, 17, 18, 19 and 20 of Township 10N, Range 4W (Maps 2 and 3). The terrain is primarily flat or moderately rolling on the eastern portion, but is topographically complex on the western portion, dissected by gullies, ravines and coulees. Elevations range from 4200 feet on the eastern edge, rising to over 5200 feet on the higher bluffs in the western part. Primary habitats include open grasslands with small pockets of conifers and deciduous trees in several locations.

The area is dissected by a number of major drainages which ephemerally hold water from snowmelt and spring rains. The largest drainage courses east/west through the central portion of the survey area (identified as "main drainage" on Map 2) and contains a small spring which provides water for an adjacent cattle trough. The area surrounding the spring is dominated by a linear stand of mature deciduous trees. Another area with mature deciduous vegetation is found in the far northwestern portion of the study area. One pasture on the northern end of the survey area was cultivated at some time in the past and is now dominated by crested wheatgrass (*Agropyron cristatum*).

The primary current land use is livestock grazing. Land modifications for livestock production include fencing of internal pastures and development of one natural spring. Historically, the survey area was used for surface and open-pit mining: surface disturbances associated with historical mining activity are evident in many places on the survey area. These disturbances include abandoned mine adits, abandoned roads, and

mine reclamation sites. Some adits have been filled or covered with grating or other barricades to prevent entry. The survey area is also used by the Montana Army National Guard (ARNG) for small unit training exercises, primarily during the spring and summer months. ARNG activities include foot and vehicular traffic, bivouacs, and occasional helicopter flyovers.

IV. Survey Methods

A. General

The primary method used to collect biological data for this project was direct observation and general reconnaissance. Observations were made by traversing the entire survey area on foot on multiple occasions (Appendix C). An effort was made to distribute observation time evenly throughout the survey area. However, extra time was spent in unique or unusual habitats of special significance to wildlife species and/or in habitats which were potentially associated with sensitive plant species. These areas included moist areas with mature deciduous trees, conifer stands, and shrub communities. A cursory reconnaissance was also made of the timbered areas near, but outside, the western edge of the survey area (identified on Map 2), primarily to locate raptor nests or other sites of special significance.

Wildlife observations were initiated in early morning (within one-half hour of sunrise) for optimal species detection. Both wildlife and vegetation data were collected simultaneously as the observer traversed the survey area. Significant observations were recorded and plotted on USGS topographic maps.

The major focus of the vegetation work was on: 1) identification of sensitive, rare, threatened, or endangered plant species and 2) characterization of major vegetation communities occurring on the site. Completion of an exhaustive plant species list was beyond the scope of this inventory. Plant ecologists from Montana State University (Bozeman) participated in the vegetation inventory. Key habitats (identified during earlier visits by the principal investigator) were surveyed, unknown plant species were collected for later identification and/or verification in the herbarium, and primary vegetation communities were described.

B. Wetland Determination

Initial observations indicated that, based on vegetative characteristics and surficial hydrology, two areas merited further examination for wetland determination (Map 4). The Wetland Specialist from the Helena Area Office of the Natural Resources Conservation Service accompanied the principal investigator to the site for a preliminary wetland analysis on 23 May. A second visit was then scheduled for 31 May to complete the NRCS site evaluation form and collect soil samples for the wetland determination.

C. Consultation with Agencies and Organizations

Prior to initiating the survey work, agencies/organizations with historical information of relevance to the biological inventory were queried. The Montana Natural Heritage Program (MNHP) completed a query of their database to determine whether any listed, rare or sensitive species had been previously identified in or near the survey area. As defined, the data query encompassed a radius of 8-miles (12.8 kilometers) centered on the expansion area. This area was deliberately much larger than the survey area itself to increase the likelihood of intersecting areas of similar habitats where more intensive inventories had been conducted. The query revealed all “element occurrences” found within the identified area. Element occurrences include plant or animal species that are rare, endemic, disjunct, threatened or endangered (state or federally), as well as other features or communities of special interest (for example, grouse leks or unusual plant associations).

Biologists with the Montana Department of Fish, Wildlife and Parks (DFWP, Helena) were consulted regarding ungulate activity in the survey area. The DFWP has conducted winter/spring aerial surveys which covered the expansion area in 7 of the last 8 years, providing a good record of recent ungulate use.

Scientists with the Natural Resources Conservation Service (NRCS, Bozeman and Helena, Montana) were consulted regarding wetland criteria and determination. As noted previously, the NRCS’ Wetland Specialist participated in the wetland determination for two candidate sites in the expansion area.

V. Results

A. Wildlife Activity

1. Sensitive Wildlife Species

The Montana Natural Heritage Program data query identified 3 element occurrence records for animal species of special concern within 8 miles of the study area: two of these occurrence records were for sensitive species and the third was for a significant habitat feature. The two sensitive species were the flammulated owl (*Otus flammeolus*) and the Westslope cutthroat trout (*Oncorhynchus clarki lewisi*). A great blue heron (*Ardea herodias*) rookery was also identified within the area encompassed by the query.

None of these species were found on the survey area. Suitable habitat is lacking on the survey area for the cutthroat trout and heron due to the absence of perennial streams or other bodies of water. Suitable habitat for the flammulated owl is not well defined for Montana, but is believed to be mature to old-growth ponderosa pine forest with a Douglas fir understory (Holt and Becker 1990). Nesting is in woodpecker holes or natural cavities. Based on these characteristics, suitable habitat for this species is present on the study area. However, no individuals were detected during the inventory work, nor were any owl “castings” found beneath cavity-bearing trees.

The gray wolf (*Canis lupus*) is federally listed as an endangered species. Although, the Montana Natural Heritage Program data query did not reveal any element occurrences of wolves within 8 miles of the survey area, wolves have been documented approximately 15 km (9-miles) west of the survey area. The gray wolf is discussed in greater detail below (see discussion of "Other Mammals").

2. Avians

The observer recorded all avians observed during each visit to the study area. Early morning sampling was distributed more-or-less evenly among the major habitat types present on the survey area. Sampling procedures followed the point-count protocols currently used by the U.S. Forest Service (Hutto 1994), combined with walking surveys and random observations.

No listed, sensitive, or rare avian species were identified on the survey area. The long-billed curlew¹, formerly listed as a "Candidate 2" (C2) species under the Endangered Species Act, was heard or observed during most visits. The C2 category was originally intended to apply to those species which might merit listing under the ESA but for which conclusive data were lacking to determine their current status. This category was recently suspended by the USFWS and those species formerly listed as C2 have either been promoted to other categories or dropped from the ESA lists; the curlew falls in the latter category.

All timbered stands were surveyed on multiple occasions for the presence of raptor nests. No raptor nests were found. A pair of adult red-tailed hawks was observed near the central part of the survey area on one occasion (30 May). It is possible that this pair nested in one of the dense conifer stands immediately west or north of the survey area, but no nest was found in the stands just outside the western periphery. An adult golden eagle was observed in flight over the survey area on 29 May.

Passerine diversity and richness were greatest in the two stands of deciduous trees on the survey area (see below, pp. 19-22). Species found in these stands included warblers (two species), lazuli buntings, robins, rufous-sided towhees, northern flickers, magpies, starlings, pine siskins and several other species. The denser shrub communities in the major drainages also provided suitable habitat for a number of bird species including chipping sparrows, towhees, rock wrens and juncos. In the grassland communities, western meadowlarks, vesper sparrows and horned larks were abundant. Several other grassland species (e.g., white-crowned sparrow and Brewer's sparrow) were found at much lower densities in isolated locales. Chipping sparrows, mountain chickadees, Clark's nutcrackers, pine siskins and several other less common species were primarily associated with conifer stands.

Two species of upland game birds were observed on the survey area. Small groups of gray partridge were observed on four occasions (and heard on several other mornings) in

¹ Scientific names not given in the text are provided in Appendix A

grassland and shrub/grassland communities. One blue grouse was observed in the conifer stand immediately west of the survey area (NW ¼, Sec. 19, T10N, R4W) on 27 May. No sharptailed grouse were observed on the study area, although this species is known to occur on the area (ARNG: Record of Environmental Consideration: Fort William Henry Harrison Expansion, no date).

A list of all avian species seen or heard on the survey area is included in Appendix X. This list is believed to include most of the species breeding on the survey area since the sampling period coincided with the peak breeding period for most western songbirds. To ascertain if any of the species observed on the survey area were unusual for this area and habitat, the avian species list was compared to one developed through a cooperative project between the U.S. Forest Service and Montana State University for similar habitats south of Helena (S. Henderson, unpublished data). Based on the preliminary results of that study, none of the species observed on the study area were uncommon for grassland habitats in this region.

3. Mammals

a. Ungulates

Overview of Ungulate Use of the Survey Area

The most reliable data for ungulate use in the expansion area are the aerial survey and radio-telemetry data collected by the Montana Department of Fish, Wildlife and Parks (DFWP). The Helena Area Biologist was consulted to obtain historical data and an overview of the importance of the expansion area to wintering ungulates (G. Joslin, pers. comm.).

For the purpose of evaluating ungulate use, it is appropriate to consider the survey area and adjoining hills as part of a larger habitat complex bordered roughly by Cherry Creek to the north, and the Blue Cloud Creek and Sweeney Creek drainages to the south and west (Map 1). The ridges and bluffs at the west end of the survey area juxtapose with both of these drainages. This ridge system continues to the northwest (to include War Eagle Hill, Dreadnaught Hill and Willit Ridge), providing a natural movement corridor leading from relatively secure USFS (Helena National Forest) and BLM lands to suitable lower elevation winter range along the western edge of the study area.

According to the DFWP Helena Area biologist (G. Joslin, pers. corr. to C. Youmans, 16 June 1992):

The Blue Cloud-Cherry Creek area is important elk and mule deer winter range. As many as 70 elk and 120 mule deer use the area during winter. Elk have been recorded in the area during every month of the year except June and July.

A later correspondence (G. Joslin, pers. corr. to C. Youmans, 14 December 1994) noted that:

The Blue Cloud Creek property is steep, open and relatively uninhabited by humans. It is utilized as yearlong habitat for 200-300 mule deer and winter range for approximately 70 elk.

Winter elk use

Aerial survey data are available for the winter/late spring of 1989, 1991-1994 and 1996. Table 1 provides a summary of the DFWP elk observations in or near the survey area. Locations are identified by legal description which may be correlated with the section lines delineated on Map 3. These aerial surveys indicate consistent winter/spring use of the area west and south of Stemwinder Hill (Map 2) by 50-60 elk and varying numbers of mule deer. Most of this use occurs during the December-April period (G. Joslin, pers. comm. to C. Youmans, 16 June 1992). The last column of Table 1 indicates the proximity of each sighting to the survey area boundary.

Table 1: Elk observations within 5 kilometers of the survey area as seen during Montana Department of Fish, Wildlife and Parks aerial surveys, 1989-1996.

<i>Survey Date</i>	<i>Group Size(s) Observed</i>	<i>Location</i>	<i>Proximity to Survey Area</i>
2/8/89	45	W $\frac{1}{2}$ Sec 18: T10N, R4W	< 1 km
4/20/91	67	SW $\frac{1}{4}$, Sec 12: T10N, R5W	< 2.5 km
12/23/91	8, 2	NW $\frac{1}{4}$ Sec 18: T10N, R4W	< 1 km
12/23/91	24	S $\frac{1}{2}$ Sec 7: T10N, R4W	< 1 km
12/31/92, 1/3/93*	16, 54	N $\frac{1}{2}$, Sec 20: T10N, R4W	< 0.25 km
4/8/94	60	NE $\frac{1}{4}$, Sec 12: T10N, R5W	< 2.5 km
3/9/96	50	SE $\frac{1}{4}$, Sec 18: T10N, R4W	within survey area

*Aerial survey data from these dates were not separated on the MDFWP maps provided

Although most of the aerial observations lay outside the study area proper, it is apparent from ground observations that the ridges and hills within the survey area receive considerable use by wintering elk. Telemetry data for five radioed elk which utilize the Stemwinder Hill area, indicate that they summer over a broad area reaching from Sweeney Creek on the south (approximately 6.4 km or 4 mi southwest of the survey area; refer to Map 1) north as far as Prickly Pear Creek (approximately 24 km or 15 mi northwest of the survey area).

Sign of wintering elk was more-or-less ubiquitous in the western, more topographically complex portion of the survey area. Sign was most abundant along the upper slopes and crests of the major ridges, particularly those areas with eastern and southern exposures. The large basin along the southern periphery of the study area (NW $\frac{1}{4}$ of Section 20 and NE $\frac{1}{4}$ of Section 19: T10N, R4W; identified as "southern basin" on Map 2) contained a

high abundance of sign. However, the DFWP aerial surveys recorded only two elk observations in this area (winter of 1992-93).

While the aerial survey data provide the best portrayal of ungulate use currently available, it is important to recognize that these surveys capture elk use for only one or two days per winter and may not provide an accurate depiction of overall ungulate distribution on the study area. This is especially true given that ungulate movements and habitat use are highly dependent on weather patterns and extent of disturbance. More frequent surveys would be required to better define elk use patterns and might reveal greater use of certain portions of the study area than is suggested by the data currently available. However, because the activities planned for the expansion area do not entail any additional disturbance over current levels, additional surveys should not be necessary for this inventory.

Summer/fall elk use

Summer use by elk is relatively light. Elk were observed on two occasions: both sightings were of lone cows and were in the same conifer stand 0.25 km west of the survey area boundary. There was no indication of any elk utilizing the survey area for calving and DFWP data indicate that elk which winter near the survey area move into the Sweeney Creek drainage (approximately 6.5 km southwest of the survey area) to calve.

Fresh elk sign was abundant west and southwest of Stemwinder Hill, indicating that elk were using this area for nocturnal foraging, and retreating into the large conifer stand west of Stemwinder Hill (NE $\frac{1}{4}$ of Section 18: T10N, R4W) at sunrise. Fresh elk beds and sign (less than one day old) were found in this conifer stand each time it was surveyed. Fresh elk sign was also occasionally found on other slopes toward the interior of the study area, suggesting that individuals or small groups of elk sometimes ventured further from the protective cover provided by the conifer stands along the western boundary. Elk use of the survey area during the fall hunting season appears to be very limited (G. Joslin, pers. comm. to C. Youmans, 16 June 1992).

Summary of elk use

Based on these observations, it is apparent that the survey area and adjoining hills to the west and northwest provide seasonally important elk winter range. Portions of the survey area, especially the western, more topographically complex part, lie along the southern periphery of an important movement corridor leading elk from secure summer/fall range to suitable winter range. During most winters, elk numbers ranged from 40 to 70 animals. Summer use of the survey area is comparatively light: a small number of elk regularly use the northwestern part of the area for foraging with lesser numbers using the more interior portions.

Mule Deer

Estimates of mule deer population size for the Blue Cloud Creek/Cherry Creek area range from 120-300 animals (G. Joslin, pers. comm. to C. Youmans: 16 June 1992 and

14 December 1994). As described above for elk, the northwest-southeast oriented ridge system which terminates on the western edge of the survey area provides an access corridor for deer to move from summer range to lower elevation winter range on and near the survey area. Unlike elk, sign of wintering deer was more evenly distributed throughout the study area, rather than concentrated primarily in the western and northwestern portions of the survey area.

Mule deer were consistently observed in the southern and western parts of the study area during the May field work. Table 2 provides a summary of these mule deer observations. Observations suspected to be duplicates (resighting of an individual or group later on the same day) have been deleted from the table.

Table 2: Mule deer observations during May 1996 field work on the Fort Harrison expansion area. Unless otherwise noted, all observation are within the survey area.

<i>Survey Date</i>	<i>Group Size(s) Observed</i>	<i>Site Description</i>	<i>Proximity to Survey Area</i>
5/6/96	10	NE ¼ Sec 19: T10N, R4W	
5/6/96	6	SE ¼ Sec 18: T10N, R4W	
5/24/96	6	Center Sec 18: T10N, R4W	
5/27/96	11	NE ¼ Sec 19: T10N, R4W	
5/27/96	4	NE ¼ Sec 19: T10N, R4W	
5/27/96	1	SW ¼ Sec 12: T10N, R4W	
5/27/96	11	SE ¼ Sec 18: T10N, R4W	
5/27/96	9	SW ¼ Sec 18: T10N, R4W	0.3 km w of survey area
5/28/96	6	SE ¼ Sec 18: T10N, R4W	
5/28/96	2	NW ¼ Sec 18: T10N, R4W	0.1 km w of survey area
5/29/96	2	NE ¼ Sec 18: T10N, R4W	0.4 km w of survey area
5/29/96	1	NW ¼ Sec 17: T10N, R4W	
7/17/96	1	SW ¼ Sec 17: T10N, R4W	
7/24/96	3	NE ¼ Sec 19: T10N, R4W	

As indicated in Table 2, all of the mule deer observed were in the western one-half of the survey area, particularly in the southwestern segment. These observations suggest that up to 36 deer may occupy the survey area, moving freely in and out of the forested areas to the west of the survey area. No fawns were observed during the fieldwork for this project. However, the fieldwork was conducted prior to the peak fawning season and it is likely that some fawning does occur on the survey area.

No deer were observed in the lower elevation open areas toward the eastern part of the survey area and sign was relatively infrequent in that portion. The topography of the southwestern part of the survey area should provide an effective buffer to shield mule deer utilizing this portion of the expansion area from disturbance associated with activities planned for the lower elevation areas.

Summary of Deer Use

The survey area is part of a larger habitat complex (in the Blue Cloud and Cherry Creek drainages) that serves as important winter range for up to 200-300 mule deer. Lesser numbers of mule deer utilize the survey area as seasonal summer range. Limited deer use occurs during the hunting season (G. Joslin, pers. comm. to C. Youmans, 16 June 1992).

b. Other Mammals

Few other species of mammals were observed on the study area during the sampling period. A coyote was observed on one occasion, and coyote "choruses" were heard on several other mornings. Evidence of coyote denning was found inside an abandoned mine shaft in the central portion of the survey area. The shaft runs horizontally for approximately 30m (99 ft) with an entrance near the bottom of a small drainage (see location of "mine shaft" on Map 2). Toward the rear of the shaft, litter (for bedding material), numerous scats and prey remains were found. It was not evident if the den was used the preceding spring, although the coyote observed on 6 May was seen near the location of the mine shaft. Bushy-tailed woodrat (*Neotoma cinerea*) sign was also found in the rear of the shaft.

Two large, dark canids were observed along the eastern flank of Stemwinder Hill on 24 May. Because the range of the endangered Rocky Mountain wolf (*Canis lupus*) is expanding in west-central Montana, this observation was potentially of special significance. The Endangered Species Branch of the U.S. Fish and Wildlife Service maintains records of breeding pairs and pack activity throughout the State. According to their records, the closest pack to the Fort Harrison area is found along the west side of MacDonald Pass, approximately 15 km (9 mi) west of the study area (E. Bangs, pers. comm.). However, several unconfirmed wolf sightings have been reported within 8 km (5 mi) of Helena (H. Youmans, MT FWP, pers. comm.; E. Bangs, USFWS, pers. comm.). No sightings were reported within the immediate vicinity of Fort Harrison and the habitat and proximity to human emplacements where the two canids were observed is atypical of wolf behavior.

The vocalizations produced by the two canids were coyote-like, but their pelage was more melanistic than a typical coyote. Also, both animals were considerably larger than a coyote. Due to the rocky terrain and heavy precipitation falling at the time of the observation, no tracks could be found to aid in species identification. It is probable that the two animals observed were feral dogs or hybrids (with coyotes). Feral dogs are known to occur in and near the survey area (S. Martinka, MT ARNG, pers. comm.) as are very dark coyotes (G. Joslin, DFWP, pers. comm.). A dead dog wearing a chain collar was later found (30 May 1996) approximately 1.5 km (0.9 mi) west of the location where the two canids were observed. This observation verified that feral dogs and/or loose domestic dogs were present near the survey area.

Pocket gopher (*Thomomys talpoides*) sign was found in several locations at higher elevations along the western edge of the survey area where loose soils provided a suitable

substrate for burrowing. A yellow-bellied marmot (*Marmota flaviventris*) was regularly observed near the cottonwood stand in the central part of the study area. Ground squirrel sign was also found in several locations, including near the deciduous trees in the central part of the study area. Lagomorph sign (*Sylvilagus sp.*) was observed along the lower slopes of several ridges.

The deeper mine shafts on the survey area provided potential habitat for bat species. The horizontal shaft identified on Map 2 was searched for bats using a flashlight; no bats or bat sign were found. Another large vertical shaft approximately 0.1 km south of the horizontal shaft was searched by observing for bat emergence at dusk, but no bats were observed. No rodent trapping was conducted as part of this biological inventory because the types of activities planned for the survey area should not cause any effects on rodent populations.

c. Other vertebrates

Only one reptile or amphibian species was observed during the sampling period. A yellow-bellied racer (*Coluber constrictor*) was observed in a sagebrush/grassland area near Stemwinder Hill. The ephemeral stands of water on the study area were searched for amphibian species, but none were found.

B. Vegetation

1. General Overview

The majority of the survey area is covered by native grasslands and grass/forb communities. Various shrub species occur in the major drainages with xeric shrub species interspersed throughout the survey area on favorable sites. Conifers are also scattered throughout the area with relatively dense stands in two locations. Mature deciduous trees are found in two locations, one in the central part of the study area and the other in the northwest corner), both in moist drainages.

Grassland habitat types described in this report adhere to the system developed by Mueggler and Stewart 1980 (*Grassland and shrubland habitat types of Western Montana*). Common names generally follow those given in Hitchcock and Cronquist (1973) or Booth and Wright (1966). The vegetation communities described below represent the major habitats found on the survey area, however, since no intensive habitat mapping was undertaken, the habitats described herein may not be exhaustive. Appendix A provides a list of plant species encountered during the site investigations as a general reference.

2. Listed, Rare and Sensitive Plant Species

The Montana Natural Heritage Program (MNHP) data query revealed 6 element occurrences for sensitive plant species documented within 8-miles of the survey area. These records included two sensitive plant species and two unique plant associations.

Further discussion with the MNHP botanist revealed that the two plant associations were actually an artifact of outdated data and were no longer considered significant (S. Cooper, pers. comm.).

Three of the element occurrence records were for the same species, lesser rushy milkvetch (*Astragalus convallarius var convallarius*), reported from different locations. The global rank for this subspecies is G5/T5: "demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery." The state ranking is S2: "imperiled because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it very vulnerable to extinction throughout its range." Typical habitat for this species is dry grassland and sagebrush desert (Hitchcock and Cronquist 1973). Therefore much of the survey area may be considered suitable habitat for this species. Lesser rushy milkvetch is a late maturing species which is best sampled from mid-July to early-August (B. Heidel, pers. comm.). Suitable habitat for this species was surveyed in mid and late July 1996; no specimens were found on the survey area.

Another sensitive species documented in the MNHP query was the small yellow lady's slipper (*Cypripedium calceolus var parviflorum*). Its global ranking is also G5; the state ranking is S2/S3 (S3 species are "either very rare and local throughout its range, or found locally in a restricted range, or vulnerable to extinction throughout its range because of other factors"). Typical habitat for this species includes bogs and damp woods (Hitchcock and Cronquist 1973) thus habitat on the study area is very limited. The two mesic deciduous areas present on the area (Map 4) were searched intensively for the lady's slipper: no specimens were found.

Although it was not reported by the MNHP data query, botanists with MNHP noted that another sensitive species which might occur in the survey area was wedge-leaf saltbrush (*Atriplex truncata*; B. Heidel, pers. comm.). It typically occurs on dry alkaline soil. This species is also late-maturing and was best inventoried during the July field sessions. No specimens were found on the survey area.

3. Grassland Habitats

The most common habitat type found on the survey area is *Agropyron spicatum/Agropyron smithii* (bluebunch wheatgrass/western wheatgrass; AGSP/AGSM h.t.). This grassland type generally occurs east of the continental divide in Montana at elevations of 4,000-5,700 (1,200-1,700m) with precipitations within the 12- to 18-inch (30- to 46-cm) range. Other graminoid species commonly found in this habitat on the study area include the following: *Stipa comata* (needle-and-thread), *Koeleria cristata* (prairie junegrass), *Poa sp.* (bluegrass), and *Festuca idahoensis* (Idaho fescue). On some of the rockier soils on the survey area, especially those with northern exposures, the AGSP/AGSM h.t. grades into a more xeric form, with lower ground cover, fewer succulent forbs and greater representation of xeric species.



Photo I: Bluebunch Wheatgrass/Western Wheatgrass habitat type as seen from the crest of Stemwinder Hill. This is the most common habitat on the survey area.

The *Festuca idahoensis*/*Agropyron spicatum* (Idaho fescue/Bluebunch wheatgrass; FEID/AGSP h.t.) habitat occurs on some of the mid-elevational sites in the survey area, particularly those with northern exposures. Mueggler and Stewart (1980) note that this type is perhaps the most commonly encountered mountain grassland type in southwestern Montana. It is a moderately mesic grassland type, occurring at elevations from 4,500 to 7,500 feet (1,400 to 2,300 m) within the 14- to 20-in (35- to 50-cm) precipitation zone.

Forbs and grasses associated with this type were similar to those of the AGSP/AGSM type. Grasses included bluegrass (*Poa sp.*), prairie junegrass (*Koeleria cristata*), and needle-and-thread (*Stipa comata*). Among the forb species found in this type were silky lupine (*Lupinus sericeous*), western yarrow (*Achillea millefolium*), and paintbrush (*Castilleja sp.*).

In lower elevations at the eastern edge of the survey area, the *Stipa comata/Bouteloua gracilis* (needle-and-thread grass/blue grama; STCO/BOGR h.t.) habitat type predominated. This type generally occurs on broad alluvial fans and benches below 5,000 feet (1,860 m) with low precipitation (8-14 in or 20-35 cm). Other grasses

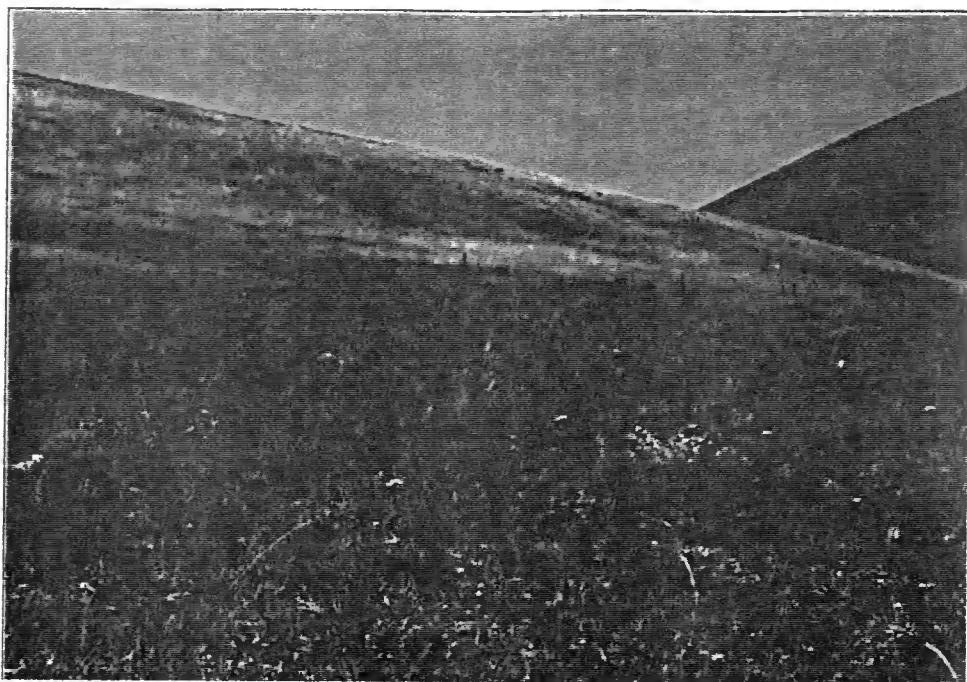


Photo 2: Idaho fescue/Bluebunch wheatgrass habitat type as seen in the south-central part of the survey area.

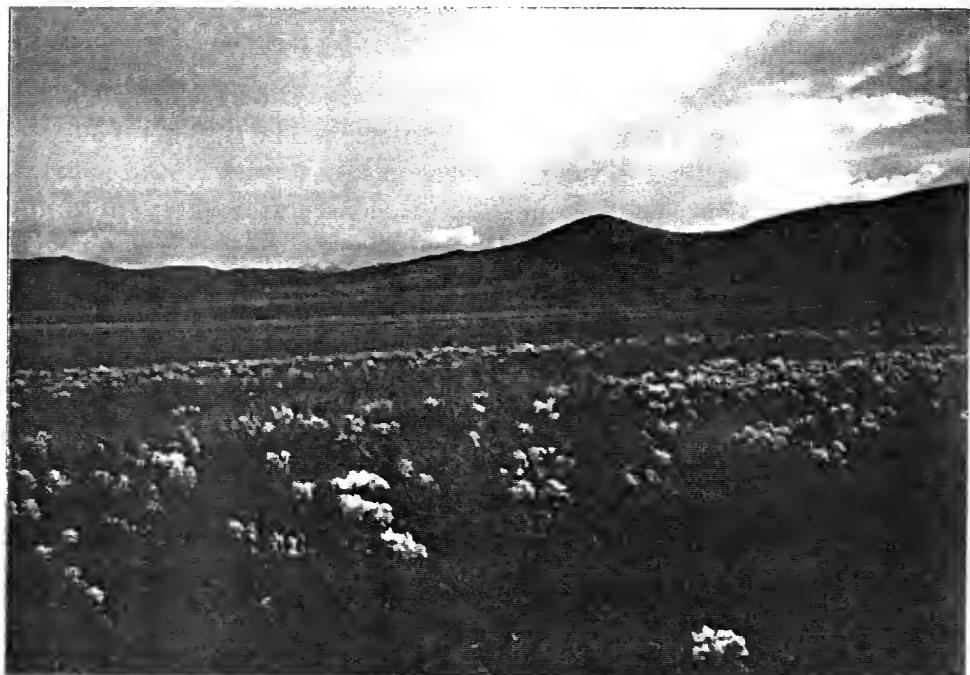


Photo 3: Needle-and-Thread Grass/Blue Grama habitat type in the lower elevation grasslands in the eastern part of the survey area. The white-flowered forb in the foreground is threeleaved milkvetch.

occurring within this type included western wheatgrass and prairie junegrass. Common forbs included threeleaved milkvetch (*Astragalus gilvyiiflorus*), Bessey pointvetch (*Oxytropis bessyae*), Hood's phlox (*Phlox hoodii*), and fringed sagewort (*Artemesia frigida*). Shrub density tended to be low.

In several sites on the study area, rough fescue (*Festuca scabrella*; FESC) is the dominant grass species, with bluebunch wheatgrass also well represented (FESC/AGSP habitat type). Mueggler and Stewart (1980) report that this habitat occurs at elevations between approximately 3,000 and 6,000 feet (900-1,800 m) on both level topography and steep slopes, and on all exposures. Other species associated with this type included Idaho fescue (*Festuca idahoensis*), smooth brome (*Bromus inermis*), cinquefoil (*Potentilla* sp.), silky lupine (*Lupinus sericeous*), prairie smoke (*Geum triflorum*), Hood's phlox (*Phlox hoodii*), western yarrow (*Achillea millefolium*), and rockcress (*Arabis* sp.).



Photo 4: Rough Fescue/Bluebunch Wheatgrass habitat type on a northern exposure in the southern part of the survey area.

4. Shrubs

A number of deciduous shrub species were found in the larger drainages, and on moderate to steep slopes (Photo 5). These shrubs provided important cover and habitat for wildlife species, including browse for deer and nesting cover for sparrows and other passerines. Intermixed in the grassland communities were big sagebrush (*Artemesia*

tridentata), silver sagebrush (*A. cana*), rubber rabbitbrush (*Chrysothamnus nauseosus*), green rabbitbrush (*C. viscidiflorus*), broom snakeweed (*Gutierrezia sarothrae*), and several other shrubs and half-shrubs. Three species of currant (*Ribes spp.*) are found on the survey area. Golden currant (*Ribes aureum*) is widely dispersed, particularly in moist or protected sites. Squaw or wax currant (*Ribes cereum*) also occurs throughout the area and is frequently encountered on disturbed sites such as old mine tailings. Redshoot gooseberry (*Ribes setosum*) was present in very localized locations in one of the larger drainages. Skunkbush (*Rhus trilobata*) was found in several drainages in the southern part of the survey area; most of the plants were dead from unknown causes. Wild rose (*Rosa woodsii*) occurs in many areas and was a common understory species beneath conifers and deciduous trees. Dense, shrub-like stands of maple (*Acer glabrum*) and chokecherry (*Prunus virginiana*) were found in some of the moister drainages, generally in the bottoms or northern exposures. Mockorange (*Philadelphus lewisii*) was another common shrub in wetter drainages. Other shrub species found on the study area are discussed below in the section pertaining to deciduous vegetation.



Photo 5: Shrub community in the "main drainage" (Map 2) including squaw currant, golden currant, and mock-orange. In the background are scattered conifers (Douglas fir and ponderosa pine) on a northern exposure in the southern part of the survey area.



Photo 6: Disturbed mine sites provided sites for establishment of shrub species (squaw currant).

5. Conifers.

Four conifer species were found on the survey area. These were Douglas fir (*Pseudotsuga menziesii*); limber pine (*Pinus flexilis*), ponderosa pine (*Pinus ponderosa*), and Rocky Mountain juniper (*Juniperus scopulorum*). Lone trees and small groups of conifers were widely scattered throughout the western part of the study area, generally on northern exposures (Photo 5).

Two mature stands of conifers are located near the western boundary of the survey area (Map 4). The first is a linear stand in a small drainage in the SW $\frac{1}{4}$ of Section 18 (T10N, R4W; identified as Conifer Stand 1 on Map 4; Photo 7). This stand consists primarily of Douglas fir and limber pine with a few ponderosa pines near the lower (northern) end. The understory consists of juniper, currant, and mixed grasses. The second conifer stand is in the extreme southwestern corner of the survey area (NW $\frac{1}{4}$, Sec 19, T10N, R4W) with ponderosa pine and limber pine in the overstory (Conifer Stand 2 on Map 4; Photo 8). These conifer stands provide important cover for ungulates and other species; deer sign and beds were commonly found in both areas.



Photo 7: Conifer Stand 1 as depicted on Map 4. Overstory consists primarily of Douglas fir and limber pine with some ponderosa pine.



Photo 8: Conifer Stand 2 as depicted on Map 4. Overstory consists of ponderosa pine and limber pine.

6. Areas with Mature Deciduous Vegetation

Two areas supported mature stands of deciduous trees (Map 4). These stands had a rich grass/forb and mixed shrub understory which included a number of species not commonly found elsewhere on the study area. Both areas lie within mesic drainages that, at least ephemerally, hold water. (Additional details on the soils and wetland characteristics in these two areas are provided below in the section on *Wetland Determination*).

The first area with mature deciduous vegetation is in the extreme northwest corner of the survey area (NW $\frac{1}{4}$ Sec 17, T10N, R4W; Photo 9). This area is identified as Deciduous Area 1 on Map 4. Dominant trees included aspen (*Populus tremuloides*), serviceberry (*Amelanchier alnifolia*), and chokecherry. One large Douglas fir is also present. Shrub species included wild rose, mockorange (*Philadelphus lewisii*), currant (*Ribes cereum* and *R. aureum*) and snowberry (*Symporicarpos sp.*). Grass species include bluegrass (*Poa spp.*), smooth brome (*Bromus inermis*), giant wildrye (*Elymus cinereus*), Idaho fescue, and bluebunch wheatgrass. A rich forb understory was also present including many of the species found in adjacent grasslands and some additional more mesic species such as false Solomon's seal (*Smilacina racemosa*), larkspur (*Delphinium bicolor*), burdock (*Arctium sp.*), and stinging nettle (*Urtica dioica*.). Both overstory and understory cover is high providing excellent habitat for songbirds and small mammals.



Photo 9: Deciduous Area 1 in the northwestern part of the survey area. Mature trees include aspen, chokecherry and serviceberry. Understory consists of mixed shrubs, forbs and grasses.

The second mesic area lies toward the lower end of the largest drainage on the survey area (SW $\frac{1}{4}$ Sec. 17, T10N, R4W; Map Z, Photos Y-Z). This area is identified as Deciduous Area 2 on Map 4. The dominant overstory tree is black cottonwood (*Populus trichocarpa*). Other shrub and tree species include chokecherry, serviceberry, maple, mockorange, snowberry, wild rose, and golden currant. Sedges (*Carex sp.*) and rushes (*Juncus sp.*), indicative of the moist organic soils present on the site, are found in the understory. Other understory species include smooth brome, cheatgrass (*Bromus tectorum*), burdock, nettle, western clematis (*Clematis ligusticifolia*), bedstraw (*Galium boreale*), bluegrass (*Poa spp.*), and dandelion (*Taraxacum officinale*). Silver sage grows on nearby transition areas into more upland habitats.



Photo 10: Deciduous Area 2 as depicted on Map 4. Overstory includes black cottonwood, chokecherry, serviceberry, maple and other shrub species. Understory consists of a diverse grass, forb and sedge community.

This mesic area is structurally complex with abundant dead and downed woody material providing habitat for cavity nesters and other avians. The number of songbird species present in this area exceeded any other part of the study area. For approximately 0.7 km (0.4 mi) upstream from the mature cottonwoods, the drainage continues to support a diverse shrub community along the bottom and south side (northern exposure) of the drainage. This section of the drainage was also rich in avian species. In the drainage bottom below the cottonwoods is a small spring which has been diverted to feed water to a nearby cattle trough. Some standing water is present immediately around the diversion



Photo 11: Deciduous Area 2 was structurally complex, with abundant dead and downed logs providing habitat for a diverse array of species.



Photo 12: Water development in Deciduous Area 2. Water is diverted from this structure into a nearby cattle trough. To the right of the structure is a small depression which seasonally held water.

site. Tracks indicated that a number of wildlife species including coyotes and deer watered at the surface water or trough. This is the only area on the survey area which consistently held water and may offer some opportunity for enhancement of wildlife habitat.

7. Problem Weeds

Three species of noxious weeds were found during the biological inventory. All three were found in limited numbers over small areas in the western part of the survey area. These were spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*), and dalmatian toadflax (*Linaria dalmatica*). Of these species, leafy spurge was the most common and was well established in the two larger drainages coursing through the survey area ("northern" and "main" drainages indicated on Map 2). The presence of these species is noted here to provide a record of their establishment for future monitoring of their distribution.

C. Wetland Determination

Two areas with mature deciduous trees, moist soils and some standing and/or flowing water were evaluated for wetland characteristics. Vegetative and hydrologic characteristics of both areas were unique relative to the rest of the survey area and hence both areas merited additional examination as potential wetlands. These areas were discussed above under *Mature Deciduous Vegetation* and are identified on Map 4. Approximate UTM coordinates (for the central part of each area) are: 412.4 x 5164.3 (Area 1 below) and 412.6 x 5163.3 (referred to as Area 2 below).

As noted previously, the NRCS Wetland Specialist was consulted for the wetland determinations in these two areas. The information presented below is based on the findings of the Wetland Specialist (N. Basting, pers. comm. to A. Harting, 3 July 1996). The NRCS protocol requires that an area must meet three criteria before it is designated as a jurisdictional wetland. These are:

- 1) presence of hydric vegetation (over 50% of the vegetation on the site is facultative or obligate wetland)
- 2) presence of hydric soils
- 3) site hydrology (water present on or near the surface)

Wetland Determination for Site 1 (NW ¼ Sec. 17; T10N, R4W):

Detailed examination revealed that this site did not meet all three criteria for wetland determination and hence it was not designated as a wetland by the NRCS. Soils were very young (mollisols), dark with low chroma and high organic content. Examination of the soil surface for hydrologic characteristics showed the presence of "drift lines" and obvious sediment deposit (gravel outwash) throughout the whole drainage area. This indicates that the drainage was once a major drainage for peak runoff events. However, less than 50% of the vegetation in the drainage was facultative (FAC) wetland or wetter.

Thus although the soils and hydrology met the wetland criteria, the vegetation did not meet the required 50% criteria and the area was not designated as a wetland.

Wetland Determination for Site 2 (SW ¼ Sec. 17: T10N, R4W):

This area met all three criteria for wetland determination and was designated as a wetland by the NRCS Wetland Specialist. This determination includes the area dominated by mature deciduous vegetation (primarily cottonwoods) and a segment of the drainage extending upstream for approximately 0.5 km (0.3 mi) dominated by various deciduous shrub species (Map 5). It does not include the grassland and shrubland areas which lie outside the drainage bottom on the north and south sides. The wetland assessment was based on the following observations:

Vegetation: The vegetation in the wetland area was all facultative or wetter. The vegetation in the adjacent banks did not meet the 50% facultative rule for wetland designation.

Soils: The NRCS soils map for this region (on file in the NRCS' Helena office) does not indicate the presence of hydric soils in the vicinity of this site. This may, however, be due to the coarse resolution of the mapping (N. Basting, pers. comm.). Examination of the soils nearest the standing water in the drainage bottom indicated that they were hydric. These were dark soils high in organic content which correspond to the young soils (mollisols) in the NRCS' soil coloration charts (10YR 2/1 in the Munsel Color Book). These soils may be labeled as "mucky peats" due to the high organic content and saturation. The soils on the adjacent banks did not appear to be hydric.

Hydrology: Site hydrology met the wetland criteria. There was definite saturation, with standing water in the designated wetland area (0-inches to surface water; 0-inches to a free water pit; and 0-inches to saturated soils). There was also a definite layer of sediment throughout the bottom of the entire drainage area indicating that the drainage was once a major drainage for peak flows.

Examination of the current hydrology and degree of channel incising in this drainage suggest that this area once exhibited greater wetland functioning than at present (N. Basting, pers. comm.). Changes in hydrological characteristics may have resulted from long-term shifts in weather or drainage patterns, or possibly from some change in land use. The same observation holds for Site 1, discussed above.

Based on this evaluation, the area indicated on Map 5 was designated as a wetland. It should be noted that this area includes all of the mature deciduous vegetation which surrounds the spring (as indicated on Map 4) and a portion of the drainage upstream from this area. Observations acquired during the biological inventory indicated that this expanded area was a focal area for wildlife and, as such, merits special consideration when planning any activities which might disturb those species utilizing these habitats.

The NRCS notes that the two wetland evaluations discussed above do not represent an official determination or wetland certification. Any major disturbance which would disrupt the hydrologic characteristics of either area such as drainage, dredging or filling would necessitate a more detailed survey and further consultation with the NRCS (406/449-5278).

VI. Recommendations

No significant impacts to plant or animal species occurring on the survey area are anticipated to result from the proposed land acquisition or associated military activities. However, should the timing of military activities be changed to include late winter/spring exercises, the following provisions would help to ensure that no significant impacts to wildlife species resulted:

- 1) the area should be surveyed for sharp-tailed grouse lekking activity in March and/or April. Although no sharptailed grouse were observed during the 1996 fieldwork, the work was initiated too late in the season to effectively census grouse leks.
- 2) state ungulate biologists should be consulted to determine if elk and deer wintering on the area have dispersed to spring/summer ranges. Aerial surveys and radio-telemetry data provided by the Montana Department of Fish, Wildlife and Parks indicate that most elk use occurs in December through May. However, severe winters or late springs may cause ungulates to remain on winter range longer than normal. Under these circumstances, consultation with state biologists may help to avoid unnecessary disturbance to ungulates already stressed from late winter conditions.

APPENDIX A:

Species Lists

I. Vertebrate Species

A. Bird Species

<u>Common Name</u>	<u>Scientific Name</u>	<u>Comments</u>
Red-tailed hawk	<i>Buteo jamaicensis</i>	
Golden eagle	<i>Aquila chrysaetos</i>	(flying overhead)
American kestrel	<i>Falco sparverius</i>	
Blue grouse	<i>Dendragapus obscurus</i>	
Gray partridge	<i>Perdix perdix</i>	
Long-billed curlew	<i>Numenius americanus</i>	
Common snipe	<i>Gallinago gallinago</i>	(observed east of survey area)
Mourning dove	<i>Zenaida macroura</i>	
Northern flicker	<i>Colaptes auratus</i>	
Eastern kingbird	<i>Tyrannus tyrannus</i>	
Horned lark	<i>Eremophila alpestris</i>	
Barn swallow	<i>Hirundo rustica</i>	
Clark's nutcracker	<i>Nucifraga columbiana</i>	
Black-billed magpie	<i>Pica pica</i>	
Common raven	<i>Corvus corax</i>	
Mountain chickadee	<i>Parus gambeli</i>	
Redbreasted nuthatch	<i>Sitta canadensis</i>	
Rock wren	<i>Salpinctes obsoletus</i>	
Mountain bluebird	<i>Sialia currucoides</i>	
American robin	<i>Turdus migratorius</i>	
Veery	<i>Catharus fuscescens</i>	
European starling	<i>Sturnus vulgaris</i>	
Yellow warbler	<i>Dendroica petechia</i>	
Yellow-rumped warbler	<i>Dendroica coronata</i>	
Lazuli bunting	<i>Passerina amoena</i>	
Rufous-sided towhee	<i>Pipilo erythrorththalmus</i>	
Chipping sparrow	<i>Spizella passerina</i>	
Brewer's sparrow	<i>Spizella breweri</i>	
Vesper sparrow	<i>Pooecetes gramineus</i>	
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	
Dark-eyed junco	<i>Junco hyemalis</i>	
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	
Western meadowlark	<i>Sturnella neglecta</i>	
Brown-headed cowbird	<i>Molothrus ater</i>	
Pine siskin	<i>Carduelis pinus</i>	

B. Mammal Species

Cottontail	<i>Sylvilagus sp.</i>	(observation of sign)
Least chipmunk	<i>Eutamias minimus</i>	
Ground squirrel	<i>Spermophilus sp.</i>	
Red squirrel	<i>Tamiasciurus hudsonicus</i>	
Northern pocket gopher	<i>Thomomys talpoides</i>	(observation of sign)
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	(observation of sign)
Coyote	<i>Canis latrans</i>	
Elk	<i>Cervus elaphus</i>	
Mule deer	<i>Odocoileus hemionus</i>	

C. Reptiles and Amphibians

Yellow-bellied racer	<i>Coluber constrictor</i>
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II. Plant Species Identified on the Study Area (The following list is not exhaustive and should be considered provisional as not all specimens have been verified in the herbarium.)

A. Trees

Rocky Mountain Maple	<i>Acer glabrum</i>
Serviceberry	<i>Amelanchier alnifolia</i>
Limber pine	<i>Pinus flexilis</i>
Ponderosa pine	<i>Pinus ponderosa</i>
Aspen	<i>Populus tremuloides</i>
Black cottonwood	<i>Populus trichocarpa (P. balsamifera)</i>
Chokecherry	<i>Prunus virginiana</i>
Douglas fir	<i>Pseudotsuga menziesii</i>

B. Shrubs, Half-Shrubs

Silver sagebrush	<i>Artemesia cana</i>
Big sagebrush	<i>Artemesia tridentata</i>
Rubber rabbitbrush	<i>Chrysothamnus nauseosus</i>
Green rabbitbrush	<i>Chrysothamnus viscidiflorus</i>
Broom snakeweed	<i>Gutierrezia sarothrae</i>
Rocky Mountain juniper	<i>Juniperus scopulorum</i>
Mockorange	<i>Philadelphus lewisii</i>
Skunkbush	<i>Rhus trilobata</i>
Golden currant	<i>Ribes aureum</i>
Squaw currant	<i>Ribes cereum</i>
Redshoot gooseberry	<i>Ribes setosum</i>
Wild rose	<i>Rosa woodsii</i>
Western snowberry	<i>Symphoricarpu s occidentalis</i>
Mountain snowberry	<i>Symphoricarpu s oreophilus</i>

APPENDIX B:

Maps

Map 1: Study Area Showing Relationship to Fort Harrison, Helena, Montana and Other Landmarks

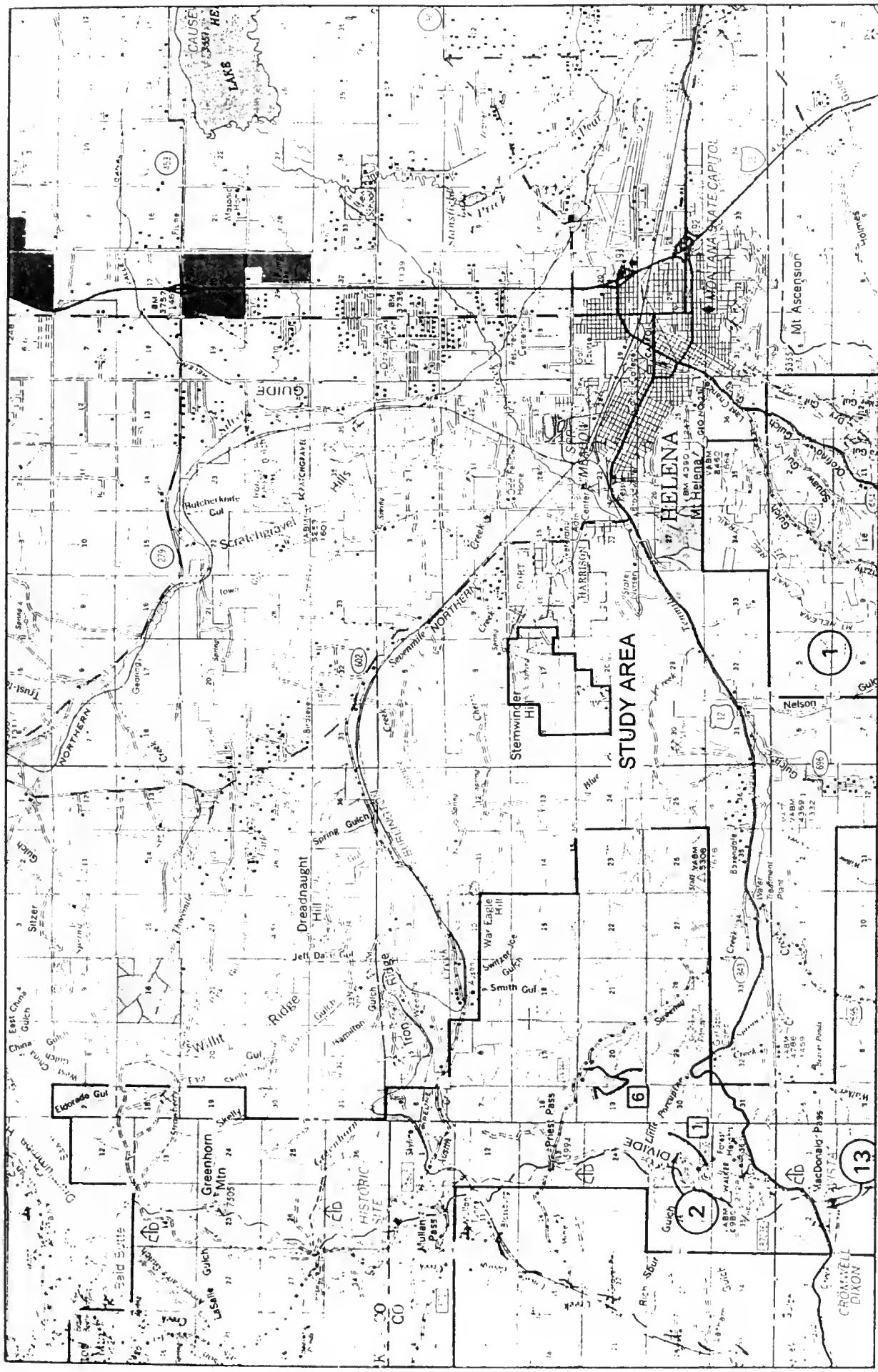
Map 2: Survey Area Boundaries and Major Landmarks

Map 3: Study Area With Survey Sections Indicated for Correspondence to Ungulate Narrative and Other Discussions

Map 4: Stands of Conifers and Mature Deciduous Trees in the Survey Area

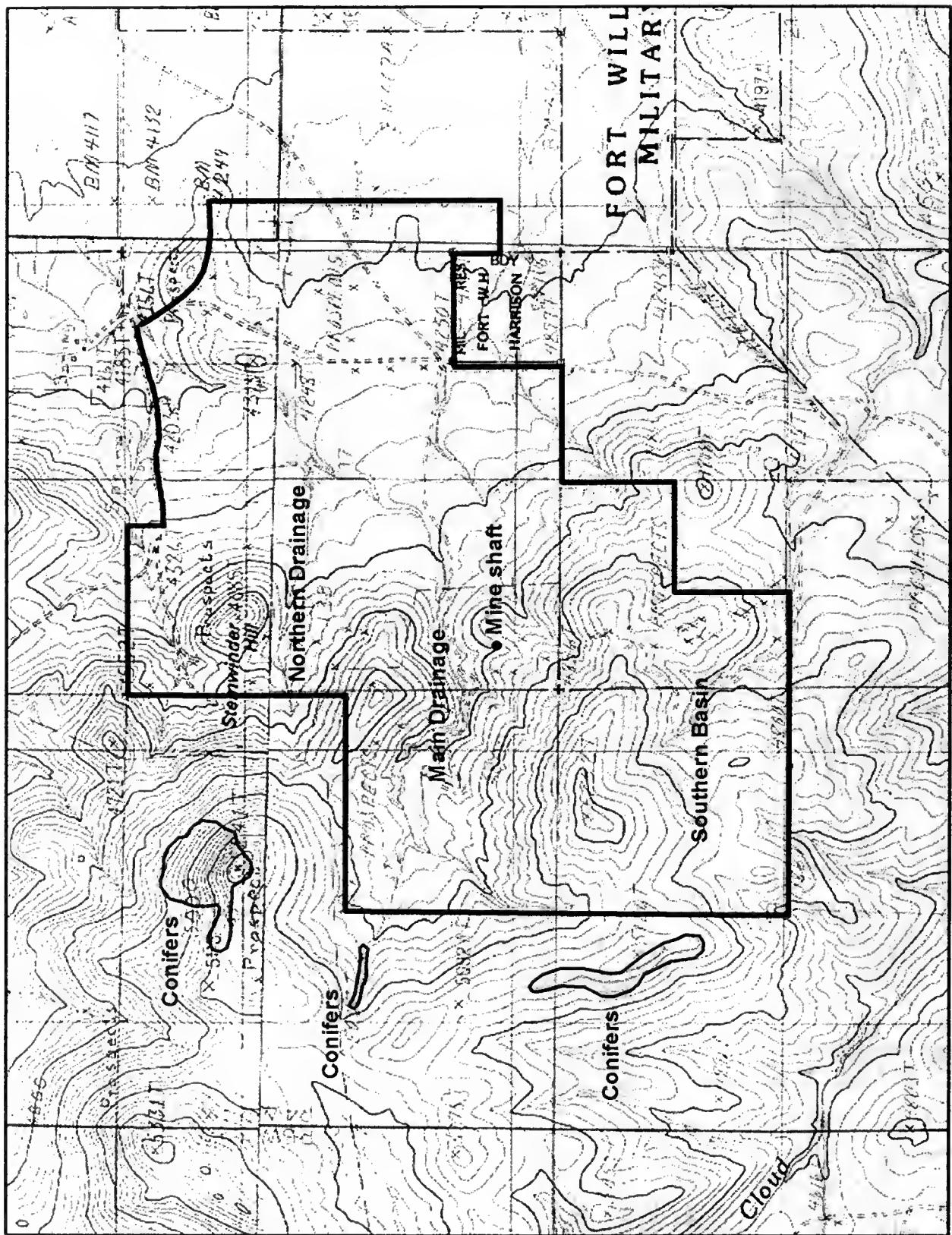
Map 5: Map of Area Designated as Wetland by the NRCS

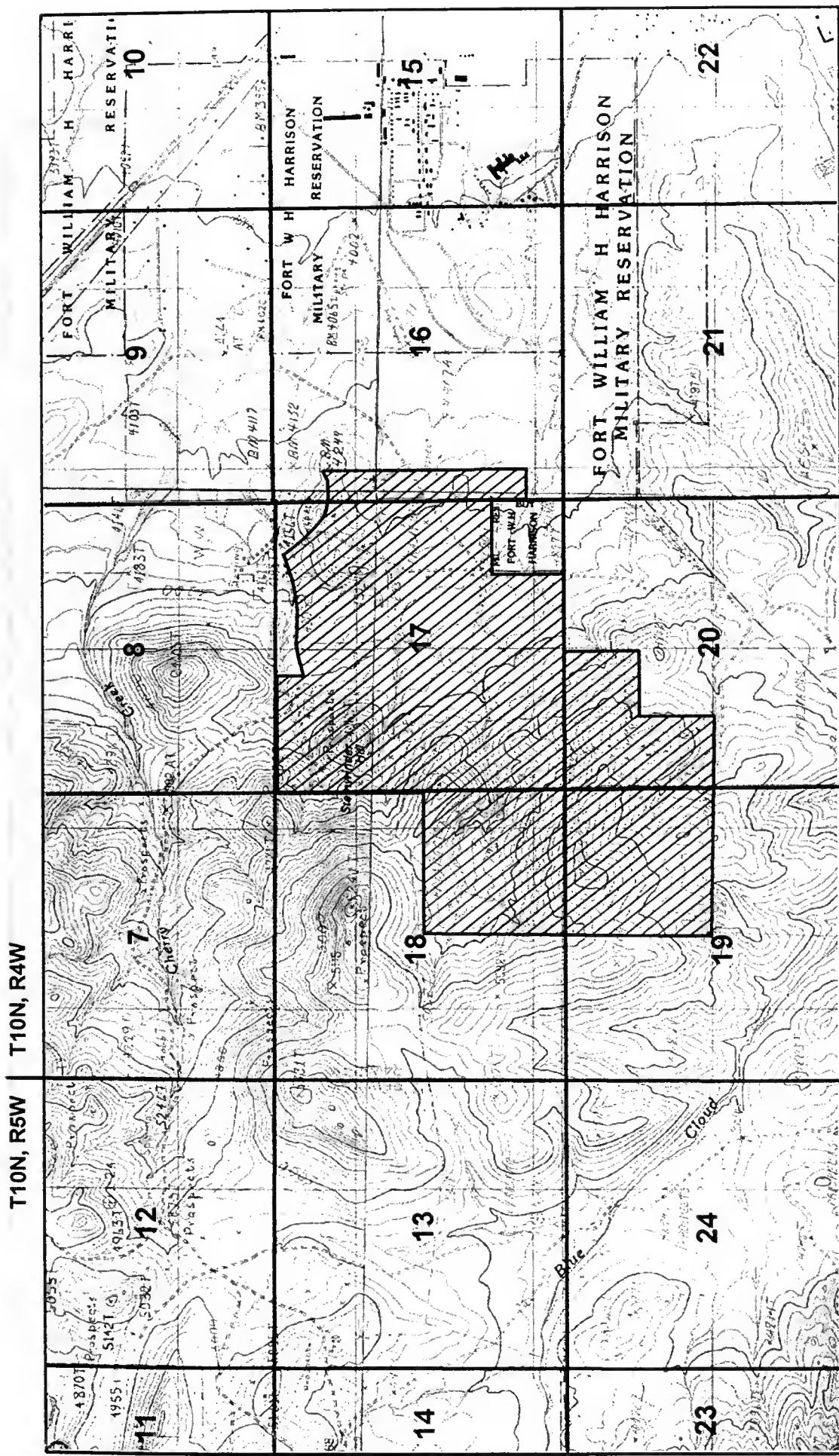
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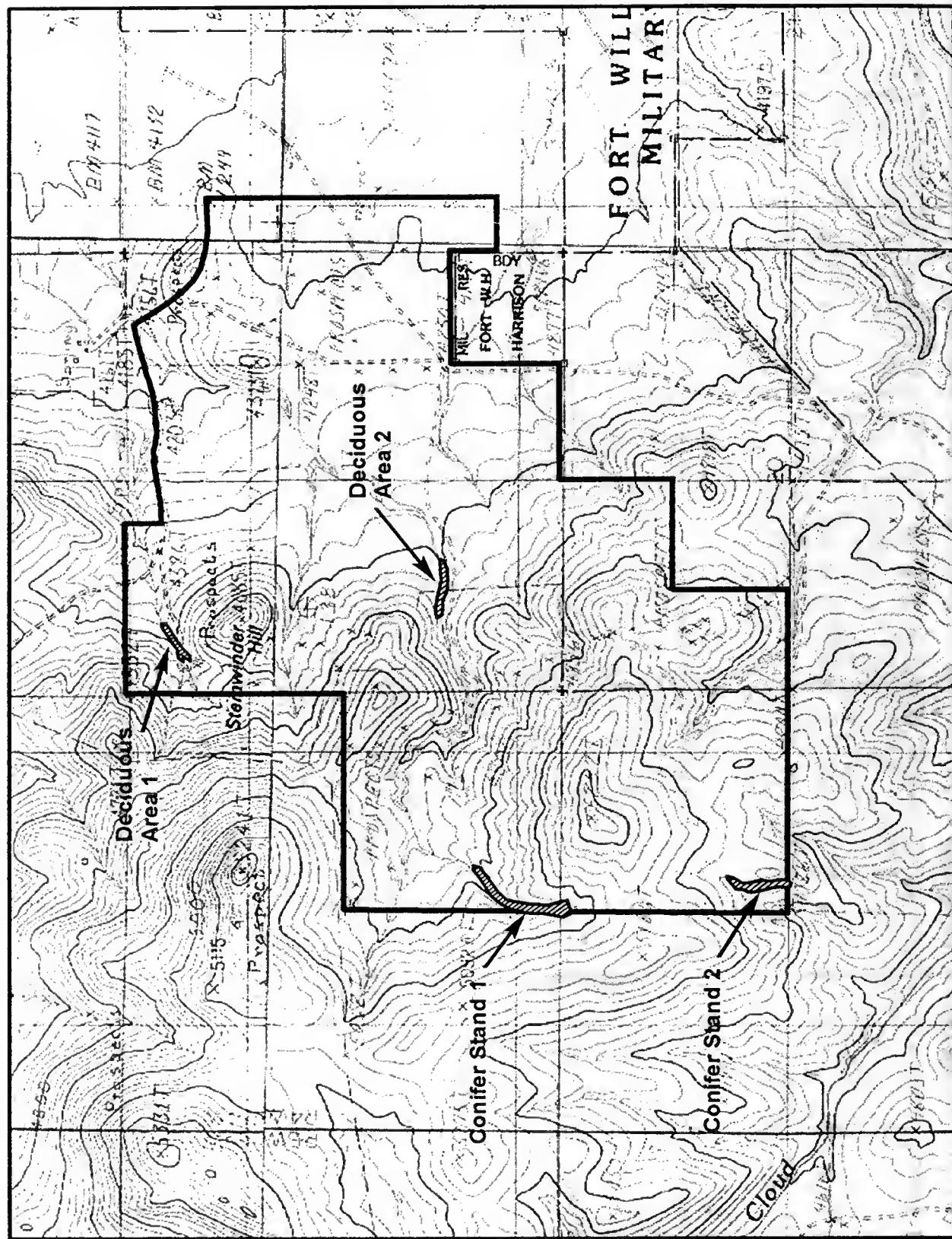
Map 1: Study Area Showing Relationship to Fort Harrison, Helena, Montana and Other Landmarks

Map 2: Survey Area Boundaries and Major Landmarks

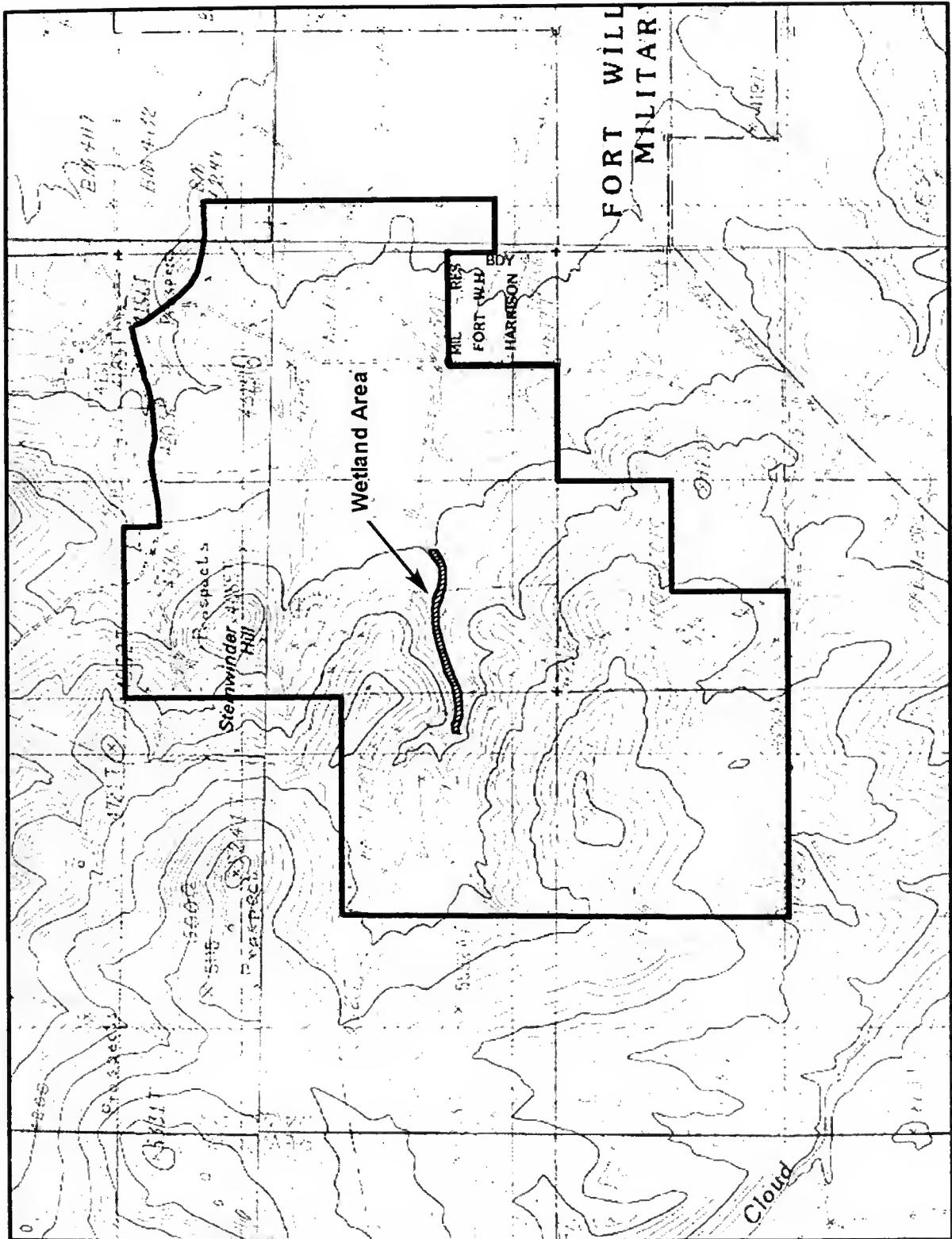




Map 3: Study Area With Survey Sections Indicated for Correspondence to Ungulate Narrative and Other Discussions



Map 4: Stands of Conifers and Mature Deciduous Trees in the Survey Area



Map 5: Wetland Area As Designated by the Natural Resources Conservation Service.
(Provisional delineation: surface disturbing activities which would disrupt the hydrology of the area would require additional consultation).

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APPENDIX C: **Schedule of Fieldwork for the Biological Inventory**

- 6 May: Initial reconnaissance of Ft. Harrison site; meeting with Major Steve Martinka (Army National Guard, Environmental Office) for site orientation; completed foot reconnaissance of survey area for cursory wildlife and vegetative overview
- 7 May- 10 May: Agency contacts to aid in proposal preparation (Bonnie Heidel, Jim Reichel and Steve Cooper: Montana Natural Heritage Program; Nancy Basting and Gordon Hill: Natural Resources Conservation Service, formerly SCS)
- 23 May: Preliminary vegetation survey and examination of potential wetland areas with Nancy Basting, Wetland Specialist (NRCS, Helena); meeting with Steve Cooper (Botanist: MT Natural Heritage Program) to discuss possible presence of sensitive plant species and/or habitats on the survey area
- 24 May: Wildlife inventory of northern and western portions of survey area; meeting with Gayle Joslin (Helena Area Wildlife Biologist, Montana Department of Fish, Wildlife and Parks) to collect historical data on wildlife use of the Fort Harrison/Stemwinder Hill area
- 27- 29 May: Wildlife/vegetation inventory of survey area. Tasks included general reconnaissance; avian surveys; examination of timbered habitats for raptor nests; survey of special or unusual habitats; survey for rare, sensitive and endangered wildlife or plant species; coordination with Major Steve Martinka and Dr. Cliff Youmans (Mt. Natl Guard)
- 30 May: Site visit with Dr. T. Weaver and C. Johnson (Department of Biology, Montana State University) for extensive vegetation and habitat survey. Entire area surveyed on foot with emphasis on unique habitats and sensitive plant species.
- 31 May: Wetland determination for potential wetland areas on the survey area with Nancy Basting (Wetland Specialist from Natural Resources Conservation Service). Data were collected for two sites, including lists of dominant plant species, soil samples and completion of NRCS wetland inventory forms.
- 17 July, 24 July: Inventory of survey area for late-maturing sensitive plant species. Additional wildlife and habitat information also collected.

APPENDIX D: References Cited

- Booth, W.E. and J.C. Wright. 1966. Flora of Montana, Part II. Montana State University, Bozeman. 305 pp.
- Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press. Seattle. 730 pp.
- Holt, D.W. and D.M. Becker 1990. Identification of Montana's owls. Reprinted from Montana Outdoors, March/April 1990. Montana Dept. Fish, Wildlife and Parks, Helena, Mont.
- Hutto, R. 1994. Field methods for landbird monitoring projects. USDA Forest Service Region 1 (Missoula, Montana), contract #53-0343-2-00207. 21 pp.
- Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah. Gen. Tech. Rep. INT-66. 154 pp.

APPENDIX C
CULTURAL RESOURCES SURVEY

MANAGEMENT SUMMARY

The Montana Army National Guard (MT ARNG) is proposing to acquire property located west of Fort William Henry Harrison, which is west of Helena, Montana. The acquired property is needed for safety buffer for small arms ranges and training exercises. The proposed acquisition includes approximately 897 acres of private land and 100 acres of Bureau of Land Management (BLM) administered lands located in Sections 16, 17, 18, 19 and 20 in Township 10 North, Range 4 West. An intensive cultural resource inventory of the study area was conducted by GCM Services, Inc., through LABAT-ANDERSON INCORPORATED, for the MT ARNG. Field work was conducted between June 24 and June 28, 1996. Five historic sites and no prehistoric sites were recorded and evaluated within the project area. In addition, 71 historic loci (isolated finds, or IFs) were found and recorded. Previously recorded sites 24LC1258 (a historic trail) and 24LC734 (a historic occupation site) were located and reevaluated.

The historic sites located are associated with 1880 to 1930 era mineral exploration and claims. These include the Syndicate/Grass Valley Lode, 24LC1276, the Silver Hill Lode, 24LC1277, the Nora Darling Lode, 24LC1278, the Silver Coin Lode, 24LC1279, and Sternwinder Lode, 24LC1280. These sites lack intact structures, association with important historic patterns, events, or persons, and have no subsurface components which could provide important information. There is little or no record of production for any of these claims. None of these sites are considered eligible for the National Register of Historic Places (NRHP).

Previously recorded site 24LC1258, the Blackfeet Road, passes along the north edge of the project area. This segment is currently used as a county road and it continues westward as a private road. This site is not eligible for the NRHP (Rennie 1995). Previously recorded site 24LC734 was originally interpreted as a possible cavalry guard post associated with Fort W.H. Harrison, and evaluated as "potentially eligible" under Criteria A and D (Kingsbury 1985). However, further research indicates that the site is associated with the Syndicate / Grass Valley Lode, and it has been re-recorded as site 24LC1276 and is now recommended not eligible for the NRHP under any criteria.

Most of the isolated finds in the project area are prospect pits or mineral claim markers associated with mineral exploration. These lack specific temporal context, but may be from as early as 1880 to modern in age. Isolated finds are not eligible for the NRHP. It is recommended that the proposed land purchase by MT ARNG can proceed with no effect to cultural resources. The study area has been almost continuously leased from the private owners and BLM during Fort Harrison's 100 year history. The past, present, and proposed future use of the area have had little impact to the landscape, and will probably ensure that the historic remains in the project area will receive minimal disturbance.

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INTRODUCTION

The Montana Army National Guard (MT ARNG) is proposing to acquire property located generally west and south of Fort William Henry Harrison, which is west of Helena, Montana. This proposed acquisition includes private land as well as Bureau of Land Management (BLM) administered lands. Prior to the purchase of these lands and in accordance with Federal cultural resource legislation, all historic and prehistoric properties must be inventoried and evaluated in terms of the National Register of Historic Places (NRHP). In order to complete the cultural resource documentation on lands proposed for purchase, the Montana Army National Guard, through Labat-Anderson Incorporated (Labat), contracted with GCM Services, Inc., to inventory and assess all cultural resources located on approximately 1000 acres proposed for purchase. Field work was conducted between June 24 and June 28, 1996. Table 1 is the legal location of the project area. Figure 1 shows the project location and recorded sites on the USGS *Scratchgravel Hills (1985)*, *Austin (1985)*, *Black Mountain (1985)* and *Helena (1985)* Provisional 1:24000 scale quadrangle maps, with insert showing general project location on the Forest Service 1:500,000 scale *Helena National Forest* map. Appendix A contains the site forms.

Inventory work was conducted to satisfy federal and state legislation requiring cultural resources inventory in compliance with: the National Historic Preservation Act specifically sections 106 and 110(a)2 (Public Law 89-665, as amended); Executive Order 11593 (Protection and Enhancement of the Cultural Environment); and the National Environmental Policy Act of 1969 (P.L. 91 - 190) implementing regulations 36CFR Parts 60, 63, 66 and 800; and the Montana Environmental Policy Act; and other state and federal legislation.

Table 1. Legal location of project area in Township 10 North, Range 4 West

Section 16: W1/2 SW1/4 NW1/4 NW1/4; W1/2 W1/2 SW1/4 NW1/4; NW1/4 NW1/4 NW1/4 SW1/4; and W1/2 W1/2 NW1/4 SW1/4 SW1/4.

Section 17: SW1/4; W1/2, SE1/4; NE1/4, SE1/4; W1/2, NW1/4; SE1/4, NW1/4; S1/2 NE1/4 NW1/4; NW1/4 NE1/4 NW1/4; S1/2 NE1/4 NE1/4 NW1/4; S1/2 NE1/4; NW1/4, S1/2 NE1/4; S1/2 N1/2 NW1/4 NE1/4; SW1/4 NE1/4 NE1/4; S1/2 NW1/4 NE1/4 NE1/4; SW1/4 SW1/4 SE1/4 NE1/4 NE1/4; SE1/4 SE1/4 SE1/4 NE1/4 NE1/4

Section 18: SE1/4

Section 19: NE1/4

Section 20: W1/2 NW1/4; NE1/4 NW1/4

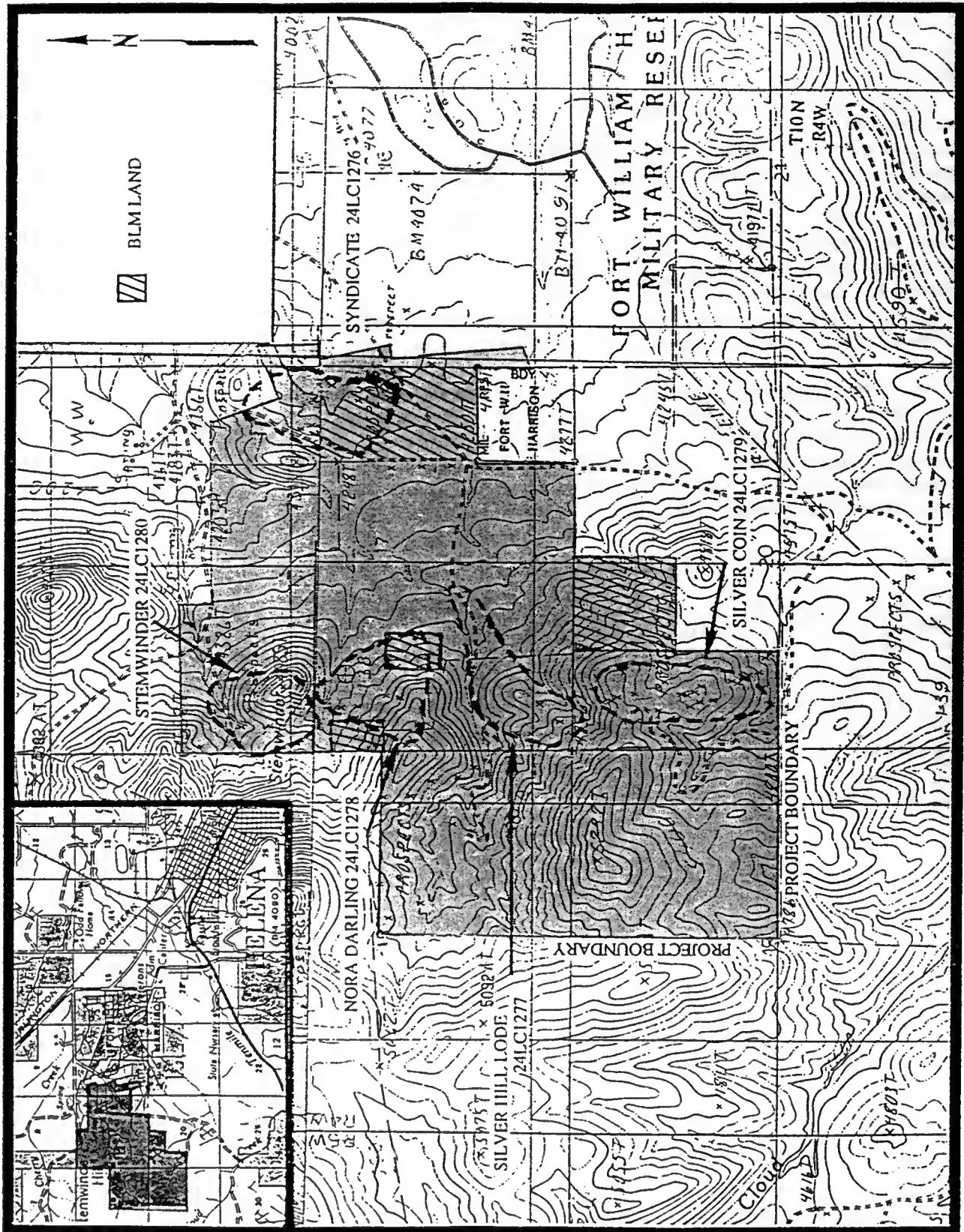


Figure 1. Project location, and recorded sites, on the USGS *Scratchgravel Hills* (1985), *Austin* (1985), *Black Mountain* (1985) and *Helena* (1985) Provisional 1:24000 scale quadrangle maps, with insert showing general project location on the Forest Service 1:500,000 scale *Helena National Forest* map

SETTING - PHYSICAL ENVIRONMENT

The project is in the foothills southwest of the Scratchgravel Hills and northwest of Helena in Lewis and Clark County. The Scratchgravel Hills are a granitic intrusion related to the early stages of formation of the nearby Boulder batholith (Alt and Hyndman 1986). It is situated between Sevenmile and Tenmile Creeks and includes Stemwinder Hill. Sevenmile Creek empties into Tenmile Creek, which flows east into Lake Helena. Vegetation in the general area falls within the Foothill Grassland type and includes wheatgrasses, fescues, needle-and-thread, lupine and phlox on the hillsides and hawthorne, serviceberry, choke-cherry, rose, sage, and aspen in the drainages (Payne 1973). Soils in the area are shallow and vary from sandy and gravelly loams to silt and clays. Figures 2 and 3 are photographs showing the general terrain of the site area.

Historic land use in the area reflects past mining activities and agriculture on private lands and military activity on private lands. Mining claim markers and prospect pits were noted mainly in the western portion of the project with some at the eastern end. Surrounding private lands have recently undergone suburban development.



Figure 2. Photo showing general terrain of the project area. Looking northeast.



Figure 3. Photo showing general terrain of the project area. Looking northwest.

PREHISTORIC AND HISTORIC CONTEXTS

Prehistoric Context

The regional cultural chronology is based upon William Mulloy's (1958) outline for the Northwestern Plains with modifications by George Frison (1978; 1991). The reader is referred to those sources for a comprehensive overview of the regional cultural chronology. This chronology is outlined as: Paleo-Indian (10,000 - 7500 years BP), Early Archaic (7500-5000 years BP), Middle Archaic (5000-3000 years BP), Late Archaic (3000-1500 years BP) and Late Prehistoric (1500-250 years BP).

The cultural chronology for the Helena area has been largely inferred from studies on surrounding regions. Surface investigations have resulted in the recognition that a number of cultural complexes are present, including Paleo-Indian Folsom, Scottsbluff, Eden and Hellgap; Early Archaic Bitterroot, Middle Archaic Oxbow, McKean, Hanna and Duncan; Late Archaic Pelican Lake and Besant; and Late Prehistoric. Subsurface testing at various sites in the region has revealed that all of the surficially visible components are also present in buried deposits (Herbort 1987).

The cultural sequence in the area has been partially defined by projectile points in stratigraphic position backed by radiocarbon dates, but the cultural sequence is poorly understood and the relationships of one complex to another is largely unknown. The presence of Paleo-Indian sites was demonstrated in the Elkhorn Mountains area during the initial archeological investigations at the MacHaffie Site, 24JF4. At that time, the site received national prominence in professional circles. Subsequent investigations in the Elkhorn Mountains area have located seven additional localities with Paleo-Indian artifacts (Herbort 1987, Davis 1984). The prehistoric cultural record of the Elkhorn Mountains, about 25 miles to the southeast of the current study area, demonstrates that Early Plains Archaic (Oxbow Complex), Middle Plains Archaic (McKean Complex) and Late Plains Archaic are well represented (Herbort 1987). Late prehistoric materials are quite common, with several large, complex sites located about 20 miles north of the study area along the Missouri River (Ferguson and Rennie 1992).

On the north end of the Elkhorn Range, about 25 mile southeast of the study area, lies the "Montana City Archeological Zone" (Herbort 1987), a National Register of Historic Places eligible prehistoric district. Consisting of approximately 2300 acres of nearly continuous archeological debris in which 32 discreet sites have been identified amid indications of 10,000 years of continuous prehistoric occupation, this "zone" is attributed to a high density of natural resources, particularly abundant chert outcroppings, where chert was quarried from bedrock or outcrops. To the west of the current study area, in the Avon Valley, are other well documented prehistoric chert quarries. About seven miles east of the study area, a Middle Archaic period site is located along lower Tenmile Creek, which flows within a mile or so of the current study area.

Prehistoric site types occurring in the surrounding area include lithic quarries, lithic workshop areas, tipi rings, rock shelters and campsites. Due to poor soil development and limited cultural remains, most prehistoric sites have low potential to contribute further significant data. Their value lies in their spatial distribution relative to various resources and overall site distribution patterns. Campsites sometimes contain intact stratified deposits, ideal for preserving archaeological information. The potential to yield significant information about prehistoric occupations is usually dependent upon, minimally, the preservation of intact activity areas or features within a site. Prehistoric sites in the study area are evaluated for their potential to contain significant information (National Register Criterion D),

generally requiring good contextual integrity, with adequate soil development to preserve the cultural horizon.

Due to the lack of permanent surface water, chert outcrops, and low potential for soil development within the study area, prehistoric sites are anticipated to be limited to surface stone features (tipi ring) and small, surficial lithic scatters. It is possible, however, that isolated areas of intense prehistoric occupation occur around small seeps or springs within the generally arid foothill environment of the study area.

Proto-historic use of the project area is characterized by the appearance of the horse and iron trade items. Occupation of the project area at this time was primarily by the Blackfeet and Shoshone tribes, with occasional use by Salish, Kootenai, Crow, Nez Perce, Gros Ventre and other regional tribes. The southern portion of the Rocky Mountain Front is documented as a prehistoric travel corridor related to specialized seasonal bison hunting expeditions conducted by tribes west of the Continental Divide. McDonald Pass, Priest Pass, Mullan Pass, and Stemple Pass are likely routes used by the western tribes as they traveled to the broad valleys and prairies of central Montana to hunt bison. Use of any of these passes may have acted to funnel travelers within a few miles of the study area, particularly along Tenmile and Canyon Creeks.

Historic Context

The first documented Euroamerican use of the general area was by expeditions of discovery, with Lewis and Clark passing through the area in 1805. In 1853, the Pacific Railroad Survey Bill led to the exploration of several routes over the Continental Divide. Lt. John Mullan established a route from the Helena Valley, over the Continental Divide (at Mullan Pass, about nine miles west of the study area) and down the Little Black Foot River drainage to Missoula. The 624 mile Mullan Road ultimately connected Fort Benton and Fort Walla Walla. It was built from 1857 to 1862. The Northern Pacific Railroad later used Mullan Pass.

The Fort Harrison military reservation is located near three historic mining districts, with Helena being the most significant. Although historic prospecting occurred near present day Fort Harrison, the area was generally insignificant in terms of mining development. Mining inspired the development of the surrounding area without leading to large scale mineral development near Fort Harrison. In addition to its proximity to more significant mining districts, the historic Helena to Blackfeet City road, 24LC1258, passed near the present day Fort Harrison. This road served as a transportation route, which connected the Helena mining districts to the Mining operations relative to Blackfeet City, continuing to Deer Lodge.

Last Chance Gulch at Helena represented the most significant early day mining activity in the vicinity of Fort Harrison. Prospectors discovered gold at Last Chance Gulch during the summer of 1864. The scale of discovery at Last Chance Gulch stimulated the initial growth of Helena and additional prospecting of the surrounding areas. The initial placer rush to Last Chance Gulch ultimately led to significant lode mining operations in the vicinity of Helena. Mining activity near the vicinity of present day Fort Harrison occupied a minor position in comparison to the placer and lode mining operations nearer to Helena (GCM 1995b).

Placer mining occurred slightly earlier in the Scratchgravel Hills, located northeast of present day Fort Harrison, than at Last Chance Gulch, but with minimal results. Lode mining followed the initial placer development of the 1860s with the first lode operation in the hills started in the early 1870s. As with the Helena discoveries southeast of present day Fort

Harrison, activity in the Scratchgravel Hills failed to encompass the Fort Harrison military reservation. (GCM 1995c).

The Blue Cloud mining district, located west of Fort Harrison, represented a relatively minor district in terms of production similar to the Scratchgravel Hills mining district. Blue Cloud is located outside the vicinity of Fort Harrison. The reported placer mining that occurred in the Blue Cloud district was quite minor in comparison to Last Chance Gulch and the workings in the Scratchgravel Hills. Despite its minor significance, it overshadowed any mineral development near the Fort Harrison area (GCM 1995d).

Mineral development within the project area mainly consisted of insignificant prospecting. Although surrounded by significant mining districts, the project area adjacent to Fort Harrison lacked significant mineral development. The development primarily consisted of prospecting and claim locating. In addition to insignificant mineral development, the number of claims within the project area is less than substantial. Eleven lode claims exist within the project boundaries. The lack of documented material on the claims reaffirms the insignificant nature of mining in the area. Mining in the area apparently consisted of basic prospecting, which evidently produced insignificant findings (GCM 1995d; BLM 1980).

Gold discovery near Blackfeet City, located west of Helena, inspired a trail connecting Blackfeet City to Helena in 1865. The trail connecting the two camps passes near present day Fort Harrison, at the north edge of the study area. Blackfeet City's fortunes were short-lived, as it entered serious decline by the early 1880s. The prospects of a major road connecting two great mining camps faded with Blackfeet City's demise (BLM 1868; Cushman 1973; Wolle 1963).

The Fort Harrison area's relationship to the early day mining economy of the area was quite insignificant in comparison to the Helena, Scratchgravel Hills, and Blue Cloud districts. prospecting and claiming occurred with few results, which influenced the areas development in non-mining related ways. The influence of mining on the surrounding area stimulated the development of transportation systems such as the Blackfeet City-Helena road. However, Fort Harrison failed to influence this roadway's development despite its proximity to it. Early development of the region near Fort Harrison largely occurred independent of mining activity within the project area.

Fort Harrison was appropriated in 1892 and constructed in 1895, originally inspired by fear of instability in the wake of the recent Indian Wars. Originally established as Fort Benjamin Harrison, in honor of the current president, it was renamed by General Order in 1906 to honor his grandfather, William Henry, the ninth president of the United states, as a Fort Benjamin Harrison already existed in his home state of Indiana (Wood 1994). The military reservation originally consisted of 1040 acres, with another 2769 acres west of the fort reserved as a water supply area. Fort Harrison's military history includes the origins of the army's elite special forces, beginning with the First Special Service Force established there in 1942 (Wood 1994).

Cattle and sheep ranching were and continue to be a principal economic use of the study area. The Head Ranch was acquired by Fort Harrison in 1910. It was an active ranch also used for various military training purposes from 1948 to 1996.

PREVIOUS CULTURAL RESOURCE WORK IN THE REGION

A background investigation of previous cultural resource work for the Fort Harrison Study Area began with a review of cultural resource files at the Department of Anthropology, Archaeological Records Office (University of Montana, Missoula) and Montana State Historic Preservation Office (SHPO) in Helena. The SHPO and Cultural Resource Annotated Bibliography System (CRABS) file is not updated, several of the reports listed below were apparently never accessioned.

The CRABS search indicated that the following inventories and site evaluations have been conducted in or near the study area, and may contain information relevant to the current project:

<u>Report Subject (abbreviated)</u>	<u>Author</u>	<u>Year</u>
Helena-West (MDOT)	Amos	1983
Green Meadow Drive	Babcock	1985
Evaluation of 24LC707	GCM Services	1995
Fort WH Harrison	Husted	1992
Site Record Form 24LC734	Kingsbury	1985
Camp Ted Schwinden	Mcleod	1987
Proposed State Cemetery	Mcleod	1985
Scratchgravel Hills	Novatne	1983
Site Record Form 24LC1113	Park	1993
Fort Harrison History	Read	1990
Site Record Form 24LC1258	Rennie	1995
Fort WH Harrison, Phase 2	Wood	1993
Cultural Resources Survey, Fort Harrison	Wood	1994
Site Form Appendix: Fort Harrison	Wood	1995

None of the previous inventories overlap much of the current study area. Wood conducted inventory and assessment of Fort Harrison and about 1600 acres of adjacent lands (1994), recording 14 cultural resources, including two prehistoric and 12 historic properties.

Two sites have been previously recorded in the study area: 24LC734 and 24LC1258. Site 24LC734 was reported as consisting of the remains of a pre-1900 military facility, possibly a guard post (Kingsbury 1985). This site was recommended *potentially eligible* under Criteria A and C. A field review and re-recording of the site indicates it is associated with past mining and is probably part of the Syndicate-Grass Valley Lode (24LC1276). Site 24LC1258, Helena to Deer Lodge Stage Road, is a historic stage route which passes through the northern edge of the project area. Due to poor integrity for most of its 54 mile length, the site is considered *not eligible* for the NRHP.

METHODS

Prior to entering the field all literature and records pertaining to the project area were reviewed. A permit authorization was requested and obtained from the BLM-Butte District prior to field investigations in anticipation of examination and possibly testing on BLM administered lands. Government Land Office records, environmental data, and basic archaeological and historical records were examined. The Cultural Resources Annotated Bibliography System records were also examined for data on previous inventories in and adjacent to the project area. Historic information was gathered from existing records pertaining to Fort Harrison. Mining records at the Montana Bureau of Mines, (Montana School of Technology, University of Montana, Butte), the Montana Abandoned Mine Reclamation Bureau, and the State Historical Society Library, Helena, were reviewed for information on mining activity in the project area.

The intensive pedestrian (BLM Class III) inventory of the project area was conducted by David Ferguson, Connie Moore, Bill Smith, Jennifer Peterson, Erik Fredlund, Britt Johnson and Tex Damon. Field work occurred between June 24 and June 28, 1996. Transects varied from 10 to 50 yards between fieldworkers depending on the terrain, which varied from nearly level to 60 percent slopes. All subsurface exposures, e.g., rodent holes, cutbanks, road cuts, were examined for artifacts possibly indicating buried cultural deposits.

All sites were recorded using standard Montana Cultural Resource Inventory forms. Each feature was described, mapped and evaluated. Maps showing the nature and extent of the cultural remains, artifact concentrations, features and basic physical features (e.g., extent of vegetation, drainages, topography) were prepared. Features were described in detail with measurements of historic sites in English units. Historic sites were dated through historical records and through evaluation of historic features. No prehistoric sites were encountered. Photographs were taken of significant features at each site.

Each site was mapped on the appropriate USGS quadrangle and photographed with black and white and color film. When possible and sensible, a semi-permanent datum consisting of galvanized conduit tubing with an aluminum survey tag was placed at the site. This was keyed to the site sketch map. The sites were also plotted on USGS 7.5 minute topographic maps. The plotting location of sites was based upon topography, which is a prominent characteristic of the project area, as well as proximity to known locations (e.g. Cadastral Survey markers, section corner markers, etc.) and hand held GPS units (no base station was used).

Isolated or minimal cultural remains were recorded as Isolated Finds (IFs). These include isolated artifacts, historic features such as small historic trash scatters, isolated prospect pits and claim markers; items indicating minimal cultural activity without specific temporal context, and with no additional information potential. These are, by definition, ineligible for the NRHP.

Significance assessments are a crucial element of the legal responsibilities of consulting archaeologists, and state and federal agencies charged with the care of cultural resource sites and materials. They are also critical to the formulation of reasonable and responsible management plans. The assessments are made by evaluating each site in respect to the National Register Criteria (36 CFR 60.4). A site was assessed as being significant and eligible for the National Register of Historic Places if it possesses integrity of location, design, setting, materials, workmanship, feeling and association, and if it meets any of the following Criteria:

- Criterion A: The site is associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B: The site is associated with the lives of persons significant in our past.
- Criterion C: The site embodies the distinctive characteristics of a type, period, or method of construction, or that represented the work of a master, or that possesses high artistic values, or that represented a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: The site has yielded or may be likely to yield information important in prehistory or history.

All historic and prehistoric sites identified on this project were evaluated and recommended either 1) eligible for inclusion to the National Register of Historic Places according to the above criteria, or 2) not eligible. All assessments are fully documented and justified. The prehistoric and historic sites were given Smithsonian site numbers and fully recorded on Montana site inventory forms.

Subsurface testing was not conducted at some of the recorded sites. The nature of the site types (e.g. historic mineral mines or prospects) are not associated with long term occupation, do not produce artifacts that would form a subsurface component, are located on rocky, often steep terrain on erosive settings, and have no potential for additional information through testing.

The old series (1868) GLO survey plat map of Section 4, T10N R4W was reviewed. This map shows the Helena to Silver City and Blackfeet roads north of the project area and no buildings or old roads in the immediate area. Kessler's Brewery is shown east of the project near Tenmile Creek.

RESULTS OF FIELD WORK

Five historic sites and no prehistoric sites were recorded and evaluated within the project area. In addition, 71 historic loci (isolated finds, or IFs) were found and recorded. Previously recorded sites 24LC1258 and 24LC734 were located and reevaluated.

The historic sites located are associated with 1880 to 1900 era mineral exploration and claims. These include the Syndicate/Grass Valley Lode, 24LC1276, the Silver Hill Lode, 24LC1277, the Nora Darling Lode, 24LC1278, the Silver Coin Lode, 24LC1279, and Sternwinder Lode, 24LC1280. These sites lack intact structures, association with important historic patterns, events, or persons, and have no subsurface components which could provide important information. There is little or no record of production for these claims. None of these sites are considered eligible for the National Register of Historic Places (NRHP).

Previously recorded site 24LC1258, the Blackfeet Road, passes along the north edge of the project area. This segment is currently used as a county road. This site is not eligible for the NRHP. Previously recorded site 24LC734 (Kingsbury 1985) was interpreted as a possible cavalry guard post associated with Fort W.H. Harrison. This interpretation was based upon the presence of military issue dishware and silverware found at the site.

Kingsbury's estimated occupation date of 1885 is congruent with the dates of the mineral claims and improvements listed on the GLO maps, but precludes the possibility of Fort Harrison involvement since the fort was not established until 1895. It is likely that the prospects were visited (or even worked) by soldiers after 1895, because of its proximity to the fort, and that the military dishware found there is a result of this association. No record of a military facility at this location was found. Other artifacts reported by Kingsbury are consistent with an 1880s short term mine occupation, and not specifically with a military guard post. Site 24LC734 is part of The Syndicate / Grass Valley Lode 24LC1276, and as such has been re-recorded and recommended not eligible for the NRHP under any Criterion.

Most of the isolated finds in the project area are prospect pits associated with mineral exploration. These lack specific temporal context, but may be from as early as 1880 to modern in age. Isolated finds are, by definition not eligible for the NRHP.

Table 2 summarizes the Loci / isolated finds, giving the IF number, the USGS quadrangle map, cadastral location, UTM location, artifact description and cultural period. Figures 4 and 5 show the locations of the isolated finds.

ISOLATE NO./ FIELD NO.	TYPE	LEGAL	SETTING	DESCRIPTION
E-1	historic prospect	NESSENENE S. 19 T10N R4W	Isolate is located on a slope facing southeast. Vegetation is mixed grasses; soil is rocky terrain.	Prospect pit 1x2 yds x 2' deep on ridgtop. Small waste pile on east side of pit
E-2	historic prospect	SWNENENE S. 19 T10N R4W	Isolate is located on a slope facing southeast. Vegetation is mixed grasses. Soil is rocky terrain.	3 prospect pits; a) 12'x7'x4.5' deep. Waste to south b) 17' diameter x 4.5'deep. Waste to south c) 2x8x2' deep; no discernable waste pile
E-3	historic cairn	NENWNENE S. 19 T10N R4W	Isolate is located on steep slope facing east. Vegetation is mixed grasses; soil is rocky.	Cairn ranging 5cmx5cmx10cm to 30cmx20cmx10cm
E-4	historic cairn	SENNENWNE S. 19 T10N R4W	Isolate is located on ridgtop, facing east. Vegetation is mixed grasses; soil is rocky	Cairn 2' in diameter; 12" high
E-5	historic prospect	SWNWNESE S. 18 T10N R4W	Isolate is on steep south facing slope above a spring drainage. Vegetation is mixed grasses; soil is sandy and gravelly loam; visibility is poor due to tall grass.	The prospect pit is 14' in diameter & 6' deep. It is located 30 ft. North of ephemeral drainage. Waste rock is minimal - possibly washed away by drainage.
E-6	historic prospect	NWNENWSE S. 18 T10N R4W	Isolate is on a south/southeast facing slope above a spring drainage. Vegetation is mixed grasses; soil is sandy and gravelly loam. Visibility is poor due to tall grass.	Two prospect pits; a) 33' x 24' x 8' deep. Waste rock on south side of pit. b) 15' in diameter x 5' deep. Waste rock piled on southeast side of pit.
E-7	historic prospect	SESWSENE S. 18 T10N R4W	Isolate is on ridgeline facing northwest. Vegetation is mixed grasses; soil is rocky and gravelley loam.	The prospect pit is 9' in diameter x 4' deep. Waste rock piled on north side of pit.
E-8	historic prospect	SWNENENE S. 18 T10N R4W	Isolate is on a steep southwest facing slope. Vegetation is mixed grasses; soil is rocky terrain.	The prospect pit is 33' x 9' x 6' deep. Waste rock surrounds pit, including mouth.
E-9	historic prospect	NWENENE S. 18 T10N R4W	Isolate is on ridgeline facing northwest. Vegetation is mixed grasses; soil is rocky and gravelley loam.	3 prospect pits; a) 12' in diameter x 7' deep & claim cairn located 5' west of pit; b) 9'x6'x3.5' deep. Waste pile on east & west sides; c) 15' x 12'. Waste pile on east side.
E-10	historic prospect	NWENENE S. 18 T10N R4W	Isolate is on ridgeline facing northwest. Vegetation is mixed grasses; soil is rocky and gravelley loam.	Prospect pit 15' x 10' x4' deep. Waste pile extends north 9' & is 3' high.

Table 2. Summary of Isolated Finds in the Project Area

ISOLATE NO./ FIELD NO.	TYPE	LEGAL	SETTING	DESCRIPTION
E-11	historic prospect	NWSWNNSW S. 17 T10N R4W	Isolate is on steep southeast facing slope. Vegetation is mixed grasses; soil is rocky and gravelly loam.	Collapsed prospect adit 30' x 7' deep. The opening extends 25'.
E-14	historic cairns	NWNWSWNNE S. 17 T10N R4W	Isolate is on fairly level terrain east of Stemwinder Hill facing northeast. Vegetation is very tall mixed grass; Soil is sandy and gravelly loam; visibility is poor.	2 possible cairns: a) 7' x 4' x 3'; b) located 6' to the southwest 4' x 3' x 1' high
E-21	historic rock pile	SWNESWNLE S. 17 T10N R4W	Isolate is facing southeast along spring drainage in fairly level terrain. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Rock pile 10' x 9' x 3.5' high rock cleared from field
E-22	historic prospect	SESESWNE S. 17 T10N R4W	Isolate is on level terrain facing south. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit 9' diameter x 1' deep. Waste pile on west side of pit extending 3' and 6" high.
E-23	historic prospect	SENESWNE S. 17 T10N R4W	Isolate is on southwest side of hill looking southwest. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit is 12' x 6' x 1' deep. Waste rock on south side of pit 1' high and extends 6' down slope.
E-31	historic prospect	SWNWSWNW S. 16 T10N R4W	Isolate is on level ground facing East. Vegetation is mixed grasses; soil is sandy and gravelly loam.	3 prospect pits: a) 15' diameter 6' deep. Waste pile on north edge of pit is piled 2' high and extends 5'. b) 15' x 6' x 3' deep; c) 24' in diameter 10' deep
E-32	historic prospect	SESESENE S. 17 T10N R4W	Isolate is on level ground facing East. Vegetation is mixed grasses; Soil is sandy and gravelly loam.	Prospect pit 12' x 21' x 5' deep. Waste pile on east & west sides of pit - 2' high, extending 3'
E-33	historic prospect	SWSWNESE S. 17 T10N R4W	Isolate is on level ground facing East. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit 15' diameter 4' deep; no waste pile
E-34	historic prospect	NENESWSE S. 17 T10N R4W	Isolate is located on dirt road on level ground facing east. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit, 9' x 6' x 1' deep. Waste rock on east side extending 8" & 1' high.
C-1	historic prospect	NWSWNWNW S. 20 T10N R4W	Isolate is located on steep, east facing slope above dirt road; Vegetation is mixed grasses; soil is sandy & gravelly loam	5 prospect pits: a) 2.5' x 8' waste pile to south; b) 4x2.5', waste pile to south; c) 2' x 3'; d) 3' x 2.5' waste pile to east & west; e) 2' x 3.5'

Table 2. Summary of Isolated Finds in the Project Area (continued)

ISOLATE NO./ FIELD NO.	TYPE	LEGAL	SETTING	DESCRIPTION
C-2	historic claim marker	NENESENE S. 19 T10N R4W	Isolate is located on steep, south facing slope north of dirt road; vegetation is mixed grasses; soil is sandy & gravelly loam	Silver Coin LM 132 cairn. Stone base with square post and metal tag attached.
C-3	historic claim marker	NESWNENE S. 19 T10N R4W	Isolate is located on steep, south facing slope north of spring drainage; vegetation is mixed grasses; soil is sandy & gravelly loam	3 cairns, no marking
C-4	historic claim marker	NWSWNENE S. 19 T10N R4W	Isolate is located on steep, south facing slope; vegetation is mixed grasses; soil is sandy & gravelly loam	Gold Coin cairn. Stone base with square post
C-5	historic claim marker	NWSENWNNE S. 19 T10N R4W	Isolate is located on steep south facing slope; vegetation is mixed grasses; soil is sandy & gravelly loam	2 Silver Coin cairns
C-6	historic cairn	NWSENWNNE S. 19 T10N R4W	Isolate located on a steep slope on the west side vegetation is mixed grass; soil is sandy & gravelly loam	Unmarked cairn
C-7	historic cairn	NWSWNWNE S. 19 T10N R4W	Isolate is located on a steep slope on the west side vegetation is mixed grasses; soil is sandy & gravelley	2 Silver Coin cairns
C-8	historic cairn	NWSWNWNE S. 19 T10N R4W	Isolate is on a saddle facing north; vegetation is mixed grasses; soil is rocky	1 unmarked cairn
C-9	historic survey marker	NESESENE S. 19 T10N R4W	Isolate is on steep, rocky, north facing slope vegetation is mixed grasses; soil is sandy & gravelley loam	Rebar; 3-6 on top
C-10	historic survey marker	SENESWNE S. 19 T10N R4W	Isolate is on located north facing slope; Vegetation is mixed grasses; soil is sandy & gravelley loam	Rebar stake
C-11	historic cairn	NWSWSENE S. 19 T10N R4W	Isolate is on northeast facing slope; Vegetation is mixed grasses; soil is sandy & gravelley loam	Cairn
C-12	historic cairn	NESWSENE S. 19 T10N R4W	Isolate is on ridge top; vegetation is mixed grasses soil is rocky	Rebar; 3-3 on top

Table 2. Summary of Isolated Finds in the Project Area (continued)

ISOLATE NO./ FIELD NO.	TYPE	LEGAL	SETTING	DESCRIPTION
C-13	prehistoric hist. claim marker	NW/SESENE S. 19 T10N R4W	Isolate is on steep east slope; vegetation is mixed grass; soil is sandy & gravelly loam	Gold Coin cairn
C-14	historic hist. claim marker	SESESENE S. 19 T10N R4W	Isolate is on east facing slope above dirt road & drainage Vegetation is mixed grasses; soil is sandy & gravelly loam	Gold Coin cairn
C-15	historic prospect	SESENENW S. 20 T10N R4W	Isolate is on steep north facing slope; vegetation is mixed grasses; soil is sandy & gravelly loam	Prospect pit 2'x3'; waste pile to east
C-18	historic cairn	NWNWSWSW S. 17 T10N R4W	Isolate is on steep, rocky, north facing slope above a spring drainage and below a dirt road; vegetation is mixed grass; soil sandy & gravelly loam	Cairn - post missing
C-19	historic claim marker	NWSWNWSW S. 17 T10N R4W	Isolate is on steep, south facing slope; vegetation is mixed grasses; soil is sandy & gravelly loam	Silver Coin cairn #131
C-20	historic claim marker	NWNWSWSW S. 17 T10N R4W	Isolate is in a spring drainage north of a dirt road; vegetation is mixed grasses; soil is sandy & gravelly loam	Post in drainage
C-21	historic cairn	NENESWSE S. 18 T10N R4W	Isolate is facing northeast on a gentle slope; vegetation is mixed grasses; soil is sandy & gravelly loam	Cairn - historic claim
C-22	historic claim marker	SWSENWSW S. 17 T10N R4W	Isolate is on steep, rocky, southeast facing slope vegetation is mixed grasses; soil is sandy & gravelly loam	Silver Coin Cairn #111
C-26	historic prospect claim marker	SESWNENW S. 17 T10N R4W	Isolate is on the east side of Stemwinder Hill.	Claim marker for Silver Coin; prospect pit with logs inside, spike nails
C-27	historic dam	SWSWNWNE S. 17 T10N R4W	Isolate is located in open terrain east of Stemwinder Hill.	Small earthen and stone dam in intermittent drainage. The stones are on the upstream side & dam is breeched.
C-28	historic dam	NWSWNWNE S. 17 T10N R4W	Isolate is located in open sloping terrain east of Stemwinder Hill.	Small earthen and stone dam in intermittent drainage. Stones are on both sides making it appear to be a bridge
J-1	historic prospect	SESENENW S. 20 T10N R4W	Isolate is on a steep northeast facing slope vegetation is mixed grasses; soil is rocky	Prospect pit is 15'x10'; the waste pile extends 9' to the northeast; unmilled timber is located 7' to the east and approximately 7' south/southeast of the pit

Table 2. Summary of Isolated Finds in the Project Area (continued)

ISOLATE NO./ FIELD NO.	TYPE	LEGAL	SETTING	DESCRIPTION
J-2	historic prospect	NWNWSWSW S. 17 T10N R4W	Isolate is at the base of a steep hill facing northeast. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit is 2.5'x3'x2' deep. The pit is located directly behind a tree (northwest).
J-3	historic prospect	Center-SWNESE S. 18 T10N R4W	Isolate is on fairly level saddle above a drainage, north of the end of a dirt road. Vegetation is mixed grasses; soil is sandy and gravelly loam.	2 Prospect pits: 8'x6'x9' deep. Waste extends 3' northeast. 8' northeast is a smaller pit: 3'x4'x2' deep.
J-4	historic claim marker	SWSENSE S. 18 T10N R4W	Isolate located on steep south slope above drainage. Vegetation is mixed grasses; soil is rocky loam.	Churn with square post. Another cairn pile to east.
J-5	historic prospect	SESENESE S. 18 T10N R4W	Isolate located on steep south slope above drainage. Vegetation is mixed grasses; soil is rocky loam.	Prospect pit 4'x6'x5' deep. Waste pile extends 6' south
J-6	historic claim marker	SESENESE S. 18 T10N R4W	Isolate located on steep south slope above drainage. Vegetation is mixed grasses; soil is rocky	Cairn with square post: NW Corner, Jerry granitic outcrop.
J-7	historic claim marker	SWNNWNSE S. 18 T10N R4W	Isolate is located north of drainage on steep slope facing south. Vegetation is mixed tall grasses making visibility poor. Soil is sandy and gravelly loam.	Gold Coin Cairn
J-8	historic cairn	SENWNWSE S. 18 T10N R4W	Isolate is located north of drainage on steep slope facing south. Vegetation is mixed tall grasses making visibility poor. Soil is sandy and gravelly loam.	Cairn, unknown.
J-9	historic prospect	SENWNWSE S. 18 T10N R4W	Isolate is located north of drainage on steep slope facing south. Vegetation is mixed tall grasses making visibility poor. Soil is sandy and gravelly loam.	4 prospect pits with collapsed "fences" and other structures made of planks. A few artifacts around the site are, i.e. coffee pot, wooden box
J-29	historic prospect	NENWSENW S. 17 T10N R4W	Isolate is located on the east side of Stemwinder Hill.	Prospect pit and 2 auto axles
J-30	historic prospect	SESWSWNE S. 17 T10N R4W	Isolate located on level ground. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Isolate includes a pit 10'x12'x2' deep; pit is filled with pieces of a cement foundation - maybe a dump for the military. 24' north is prospect pit 8x6x1' deep.
J-31	historic prospect	NESENWSE S. 17 T10N R4W	Isolate is located on level ground. Vegetation is mixed grasses. Soil is sandy and gravelly loam.	Trench 15'x9'x2'. There are 2 other trenches that look like dozer cuts. Possible military trenches???

Table 2. Summary of Isolated Finds in the Project Area (continued)

ISOLATE NO./ FIELD NO.	TYPE	LEGAL	SETTING	DESCRIPTION
J-36	historic prospect	SWSNWSESW S. 17 T10N R4W	Isolate located on steep northwest facing slope. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Cluster of 6 prospect pits. nails in timber. Also are cut logs and stacked timber stakes. Possibly connect to homesite.
T-2	historic claim marker	SESWSWNE S. 18 T10N R4W	Isolate located at drainage facing southeast. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Claim marker (cairn?).
T-3	historic prospects	NWSWSWNW S. 12 T6N R3W	Isolate on steep south facing slope. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit 18'x 15'x5' deep. 3 waste piles in area and a scar area with waste piles on each end.
T-7	historic cairn	SWNENWNE S. 17 T10N R4W	Isolate is on level ground facing east. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Survey cairn - pile of rocks in drainage.
L-1	historic prospects	SESESE S. 18 T10N R4W	Isolate is on facing northeast on a steep slope south of a drainage. Vegetation is mixed grasses; soil is sandy and gravelly loam.	Prospect pit 14'x10'.
W-1	historic prospect	SWNENESE S. 18 T10N R4W	Isolate is on steep west facing ridge above a drainage. Vegetation is mixed grasses; soil is rocky	Prospect pit 5'x3'
W-2	historic prospects	NWSENENE S. 18 T10N R4W	Isolate is on southwest slope above a drainage. Vegetation is mixed grasses; soil is rocky.	Prospect pit 7'x15'
W-3	historic prospect	NESENENE S. 18 T10N R4W	Isolate is facing southwest on slope above a drainage. Vegetation is mixed grasses; soil is rocky	Prospect trench 2'x20'
W-4	historic prospects	NESENENE S. 18 T10N R4W	Isolate is facing south on slope above drainage. Vegetation is mixed grasses; soil is rocky	Prospect pit 2'x2'
BJ-3	historic prospects	SWSESESE S. 18 T10N R4W	Isolate is on slope facing northeast. Vegetation is mixed grasses; soil is sandy and gravelly	Prospect pit 30'x12'x4.5' deep. Waste rock extends south and is 2' high.
BJ-4	historic prospect	NENWSWSE S. 18 T10N R4W	Isolate is on slope above drainage facing northeast. Vegetation is mixed grasses; soil is sandy and gravelly.	2 prospect pits: 3'x5'x1' deep; 10'x5'x1.5' deep.

Table 2. Summary of Isolated Finds in the Project Area (continued)

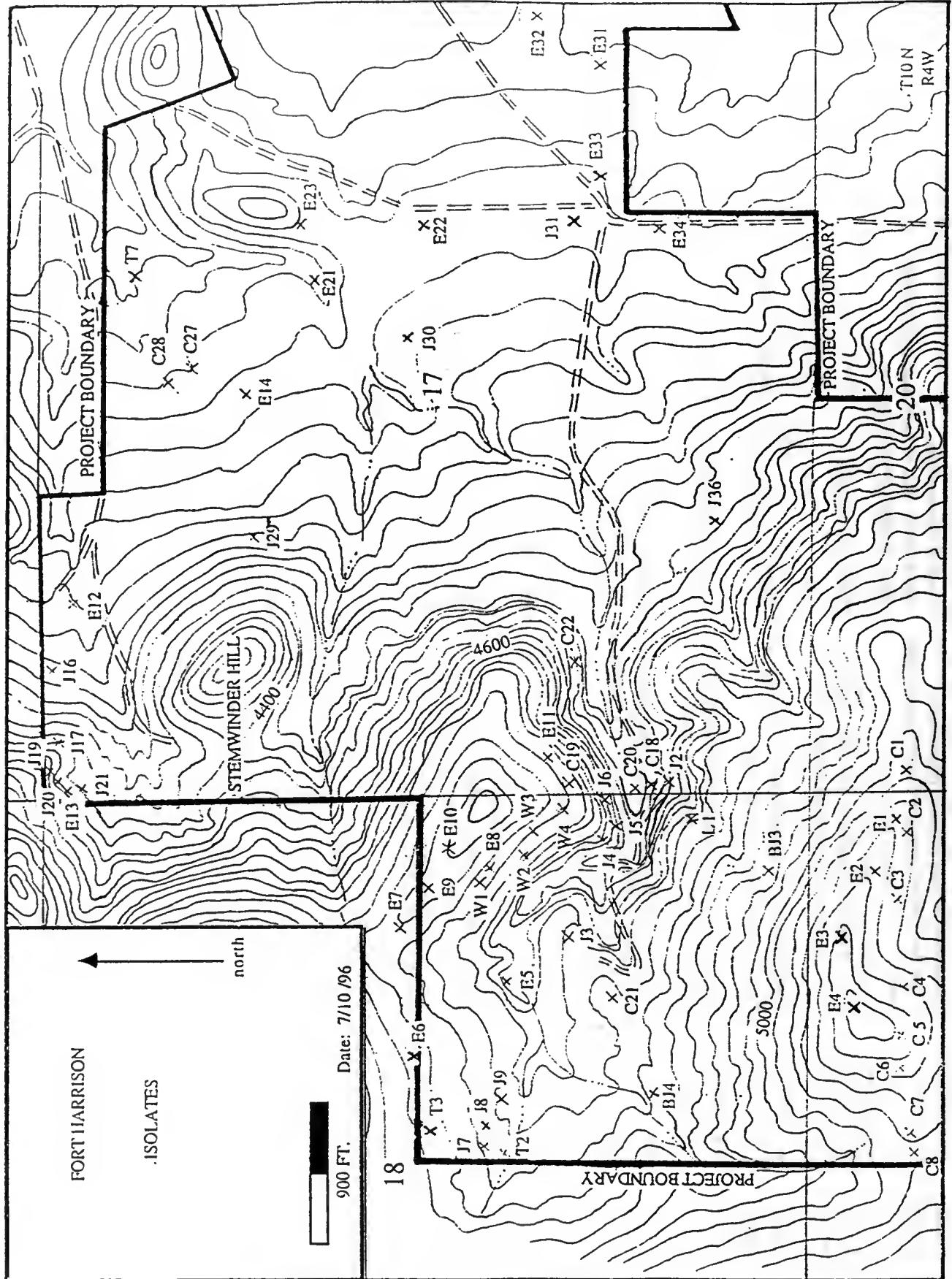


Figure 4. Locations of Isolated Finds on the north half of the Project Area

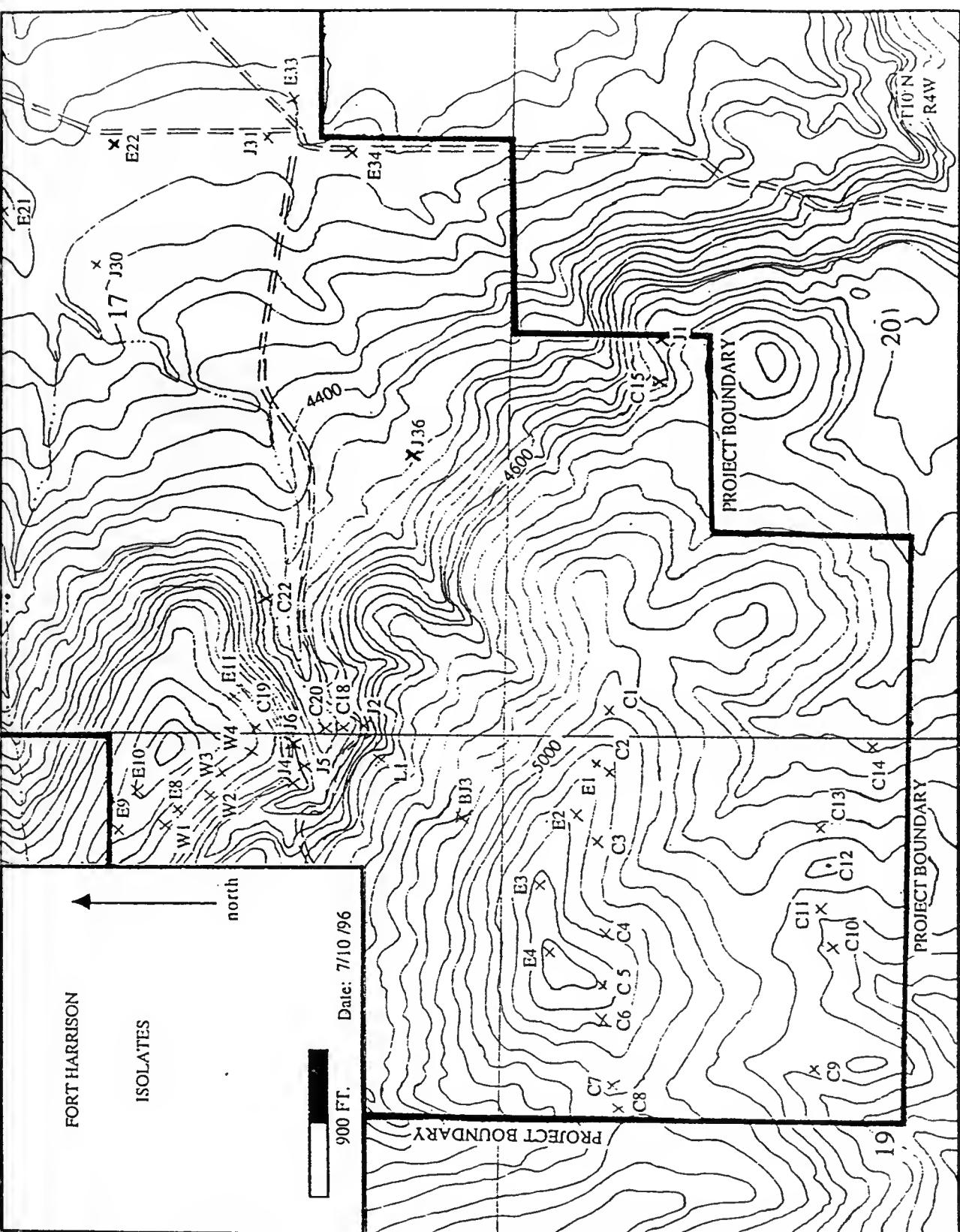


Figure 5. Locations of Isolated Finds on the south half of the Project Area

Site Narratives

Site narratives provide a summary of information for each site. Beside the narrative, site maps are included. The narratives are grouped by section beginning with Section 16, T10N R4W. Site inventory forms contain more specific information and photo documentation.

Syndicate/Grass Valley - 24LC1276, previously recorded as 24LC734

Site type: Historic mine

Legal location: SE NE, SE NE NE, E1/2 SW NE NE, NW NE NE SE, and NE NW NE SE, Section 17, T10N R4W

Owner: Private and BLM

Map: Figure 6

Description: The site consists of the remains of an earth foundation, root cellar, possible powder magazine and scattering of historic debris, with a shaft and various prospect pits and trenches associated with this lode located on the adjacent hillside. The site boundary, defined by the distribution of features and artifacts is 1125 ft east to west by 2000 ft north to south, covering an area of roughly 51 acres. The site is located in an open grassland area bisected by an ephemeral drainage. Vegetation at the site is mixed grasses, hawthorne, sagebrush, prickly pear and rose bush.

Features:

F-1: Prospect shaft (open) and waste rock dump (35 ft long and 6 ft deep), with 8 ft by 8.5 ft waste rock pile extending to the north and west. Small prospect pits are located in this general area: North, immediately off the waste rock dump is a prospect pit 2 ft by 3 ft; 12 ft northeast of the shaft is a pit 2 ft by 2 ft; a 3 ft by 2.5 ft prospect pit is located on the south side of the shaft ; and a prospect pit, 3 by 4 ft, is located 7 yards west of the shaft.

F-2: Two prospect pits, one measuring 12 ft in diameter and 5 ft deep with a waste rock pile on the west side of the pit. The second pit is located 15 ft south and measures 20 ft by 14 ft by 3 ft deep with the waste rock pile on the west edge of the pit. The pits are located 15 ft apart.

F-3: prospect pit (6 ft in diameter 3.5 ft deep). This simple feature has a waste rock pile 1 ft high. F-4: prospect pit (8 ft in diameter and is 3.5 ft deep). The waste rock pile extends 4 ft to the south and is 1 ft tall. F-5: prospect pit (15 ft in diameter and is 4.5 ft deep). The waste rock pile extends 12 ft to the south and is 3 ft tall. F-6: prospect pit (5 ft in diameter and is 2 ft deep). F-7: prospect pit (8 ft in diameter and is 3.5 ft deep). F-8: prospect pit (12 ft in diameter and is 4 ft deep). The waste rock pile is 3 ft high and extends 12 ft to the east. F-9: prospect pit (9 ft in diameter and is 3 ft deep). The waste rock pile extends 6 ft to the south and is 2 ft tall. F-10: prospect pit (4 ft in diameter and is 1.5 ft deep). There is no disable waste rock pile. F-11: prospect pit (8 ft by 7 ft and is 10 ft deep). The waste rock pile extends 14 ft to the west and is 3.5 ft tall. F-12: prospect pit (13 ft by 17 ft and is 6 ft deep). The waste rock pile extends to the 33 ft to the west and is 5 ft tall. F-13: prospect pit (9 ft in diameter and 3 ft deep) with waste rock pile 1 ft high extending 4 ft to the west. F-14: prospect shaft (9 ft in diameter and 20 ft deep). Most of the waste rock pile has been moved; what is left measures 3 ft wide by 1 ft high. F-15: prospect pit (9 ft in diameter by 10 ft deep). The waste rock is piled 2 ft high and extends 6 feet to the South. F-16: prospect pit (20 ft by 10 ft by 2 ft deep) located in a drainage. The waste rock pile is 4 ft high on the north and south sides of pit. F-17: prospect pit 30 ft in diameter by 13 ft deep. The waste rock is 5 ft high and extends 30 ft to the southwest.

F-18: possible powder magazine remains consisting of a 12 by 24 ft depression cut into the side of an ephemeral drainage. The dug out is lined with stone. A second depression 6 ft to the east, is 25 ft by 8 ft in diameter. Also located around the feature is window glass, purple bottle glass, dark amber bottle glass, a shovel head, a pitchfork head, and a mill file.

F-19: prospect pit (4.5 ft in diameter by 1.5 ft deep). The waste rock pile extends to the southeast 2.5 ft. F-20: prospect pit located 3.5 ft south of F-19 (4 ft by 3.5 ft by 3 ft deep). F-21, a prospect shaft (5.5 ft by 4 ft and 35 ft deep), is located directly south of F-20. The waste rock pile for F-21 is 6 ft long by 5 ft high and extends 6 ft to the west, wraps around the south end of the shaft and extends east 34 ft. F-22: prospect pit (2 ft by 3 ft by 1.5 ft deep) located directly south of F-21. F-23: prospect pit attached to the south end of F-22 (7.5 ft by 4 ft and is 3 ft deep).

F-24: pile of red brick to the south of F-23, possible the remains of a chimney.

F-25: prospect pit 26 ft east of F-21 (4 ft in diameter and is 1.5 ft deep). The waste rock pile is to the northwest 1 foot. This pit is located in an ephemeral wash.

F-26: group of prospect pits with wood debris, beam, metal debris, china. A pit in the side hill measures 3 yards by 5 yards four yards to the southeast is (a) 3 yards by 4 yards; (b) is west 2.5 yards (2 yards by 1 yard); (c) is 1 yard north of (b) (3 yards by 4 yards); (d) is located 5 yards south of (b) (3 yards by 3 yards); and (e) is located 1 yard south of (d) (3 yards by 2 yards).

F-27: prospect pit (2 ft by 1.5 ft and 1/2 ft deep). This feature has 2 by 8 inch lumber in pit and scattered with other miscellaneous sizes (round nails) on east side of pit.

F-28: prospect pit 2.5 by 1.5 ft and 1/2 ft deep. F-29: prospect pit (2 ft by 1 ft and 1/2 ft deep) located 1 foot east of F-28. The waste rock pile extends to the east 1 foot. F-30: prospect pit (1 ft by 5 ft by 1/2 ft deep) located 6 feet south of F-29. The waste rock pile extends to the southwest 3 feet. F-31: prospect pit located 5 feet south of F-30, 2.5 ft in diameter by 2 ft deep. F-32: dozer cut located 3 ft south of F-35 (10.5 ft by 3 ft). Two feet to the northeast is a horseshoe shaped prospect pit (6.5 ft by 1 ft). F-33: prospect shaft (5 ft by 4.5 ft by 5 ft deep) located 3 ft south of F-32. The waste rock pile extends to the east (6 ft by 3 ft by 2 ft high). F-34: two small prospect pits and adjacent trench (9 yards long by 2 yards wide).

F-35: probable building foundation consisting of a leveled area (25 by 15 ft) dug into the slope, with mounded earth around the edges. The dugout is located 20 yards east of the road. In the general area of this feature the following debris was observed: window glass, dark green glass, metal bottle top, tin sheeting, crockery, ribbon wire, deep blue glass, aqua glass, metal pipe, amber glass, purple glass, china, black plastic comb fragment, metal debris, green glass, wire nail, metal sieve, shovel fragment, coal scoop, many nails, glass, melted glass, metal bottle caps, wood debris, white opaque jar, and the bottom reads RE Sinol Balto MD Chemical Co.

F-36: prospect pit (3.5 ft by 4.5 ft and 4 ft). The waste rock pile extends 2 ft to the southeast. The pit is located 2 ft west of the road. F-37: prospect pit (2.5 ft by 4 ft by 3 ft deep). The waste rock pile extends 5 ft to the east merging with another prospect pit 2 ft in diameter by 1 ft deep. F-38: prospect pit (3.5 ft by 10.5 ft by 5 ft deep) with a 2 ft by 1 ft extension on the west side. The waste rock pile extends 4.5 ft to the east and is 1.5 ft high at edge of the pit.

F-39: Prospect shaft (5.5 ft by 4. ft by 15 ft deep). The waste rock pile extends from the north side and the south side to the east in a "triangular" shape (13 ft by 5.5 ft by 3 ft high). The road is located 12 ft from the north end of the waste rock pile. Nine feet to the west is a concrete pad (1 ft by 2 ft) with rebar on each of the four corners. The concrete pad is 3 ft from the road.

F-40: Prospect pit 3.5 ft by 3 ft by 2 ft deep, located 4 feet from F-39. The waste rock pile extends 1 ft to the southeast.

F-41: A waste rock pile (5 ft by 15.5 ft by 1.5 ft tall). A bell-shaped, bottomless bowl made of thick metal was located on the southwest corner of the waste rock pile. To the west are three prospect pits running south to north. Their measurements are, respectively (1 ft by 2 ft and 1 ft deep; 4.5 ft by 3.5 ft and 1.5 ft deep; and 2 ft by 2.5 ft and 1 ft deep). An old vegetable can was located here with a piece of wood wrapped with wire stuck inside the can. Prospect pits are 25 ft east of road.

F-42: Four prospect pits: (a) 2 ft by 1 ft by 1/2 f. deep with waste rock pile 1 ft to the south. Pits (b) and (c) are located 1 ft south of (a). (b) is 2.5 ft by 3 ft by 1 ft deep, and (c) is 2 ft in diameter by 1.5 deep and the waste rock pile is 1 ft to the south. Pit (d) is northeast of (c) and is 4.5 ft by 2.5 ft by 1.5 ft. The waste rock pile is 1 ft to the south.

F-43: This small prospect pit is located outside of the survey area.

F-44: A cluster of prospect pits that are 6 yards northwest from the road: A BLM Benchmark is located on the East side of this cluster of pits. It marks the Diamond R claim: BLM Bm MS 8551 MS 2605 1974.

Artifacts: Window glass, purple glass, shovel head, pitchfork, dark amber glass, and a file were observed at Feature 18. Feature 24 is a pile of red bricks. In Feature 27, 2 by 8 inch lumber and miscellaneous sizes of round nails were observed. Window glass, dark green glass, metal bottle top, tin sheeting, crockery, ribbon wire, deep blue glass, aqua glass, metal pipe, amber glass, purple glass, china, black plastic comb fragment, metal debris, green glass, wire nail, metal sieve, shovel fragment, coal scoop, many nails, glass, melted glass, metal bottle caps, wood debris, and a white opaque white jar with embossed bottom "RE Sinol Balto MD Chemical Co." were observed in and around Feature 35. Located on the southwest corner of the waste rock pile at Feature 41 was a bell-shaped, bottomless, cast iron bowl, as well as an old vegetable can with a piece of wood wrapped with wire stuck inside the can (remnants of a common mineral claim marker, which may not be of historic vintage).

Testing: The nature of the site precluded the need for extensive subsurface testing. Feature 35 and 18 (possible building depressions) were tested with 30 by 30 by 30 cm shovel tests which revealed rocky ground with no soil deposition, and no subsurface cultural material. The majority of feature types present are not associated with a focus of activity or extended occupation. Much of the site setting is erosive; being on a sloping ground with thin rocky soil and bedrock outcrops.

History: The Grass Valley Lode was patented in November, 1880, to William H. Patterson, Oliver Gregg, and William LaReau (Mineral Survey Plat 921, 1880). The early series GLO survey map shows that "improvements" on the 6.88 acres include a discovery shaft 35 ft deep, a tunnel 140 ft long, a shaft 60 ft deep and the stoping of ore. The Syndicate Lode was patented in February, 1885, to Marg B. Sperling. Improvements on the 14.28 acres included two discovery shafts, an open cut, eight shafts and unspecified buildings (Mineral Survey Plat 2015, 1880).

Prospecting at both lodes is focused upon the exploration of a fault or contact zone which runs roughly north-south through the project area. Other isolated prospects are located along this geological feature outside of the site boundary.

Portions of this site were previously recorded as 24LC734 in 1985 (Kingsbury 1985). At that time the site was interpreted as a possible cavalry guard post associated with Fort W.H. Harrison. This interpretation was based upon the presence of military issue dishware and silverware found at the site. Kingsbury's estimated occupation date of 1885 is congruent with the dates of the mineral claims and improvements listed on the GLO maps, but precludes the possibility of Fort Harrison involvement since the fort was not established until 1895. It is likely that the prospects were visited (or even worked) by soldiers after 1895, because of its proximity to the fort, and that the military dishware found there is a result of this association. No record of a military facility at this location was found. Other artifacts reported by Kingsbury are consistent with an 1880s short term mine occupation, and not specifically with a military guard post.

Integrity: The site integrity is poor. Nothing but leveled earth foundations remain of the few mine related structures associated with this site. Remaining prospecting scars are undifferentiated from hundreds of others in and adjacent to the project area. The artifacts present are common use items which offer little additional interpretive information to the site.

NRHP Eligibility: The claim is representative of early lode prospecting and mining in the area. This is one of a few claims in the area where extensive work was done, however, this site is not associated with important historical events nor is the site associated with persons of historical prominence. These lodes did not have a remarkable production record. The site does not possess examples of unique or archetypal technology or architecture. The site has no subsurface potential to reveal additional important historical information. In 1985 portions of the site (recorded as 24LC734) was listed as potentially eligible under Criteria A and D. In light of the tenuous association with the fort and the lack of subsurface materials based upon shovel tests, it is recommended that the original evaluation be updated: the site is not recommended to be eligible for the NRHP under any Criterion.

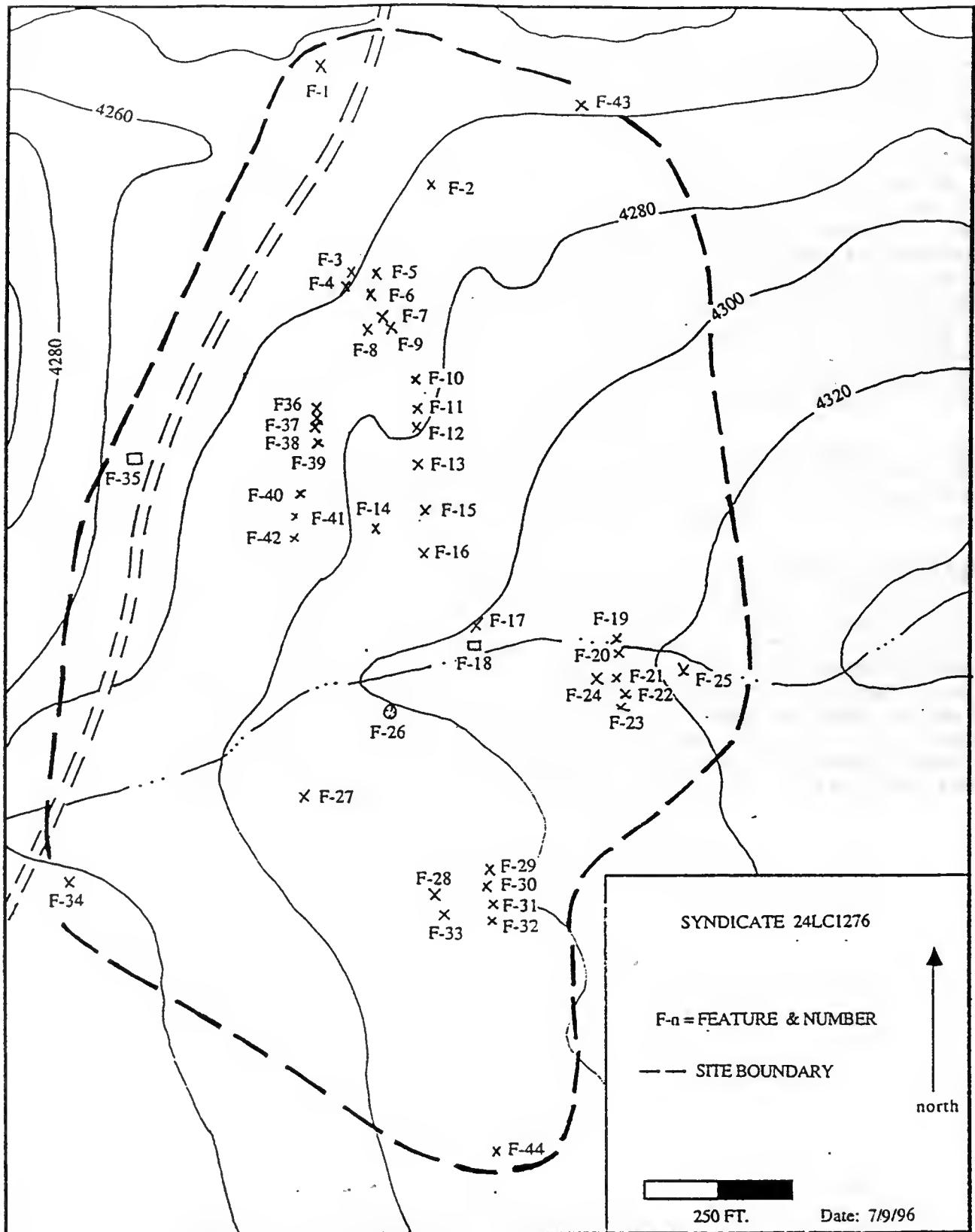


Figure 6. Site sketch map of the Syndicate/Grass Valley - 24LC1276.

Silver Hill Lode - 24LC1277

Site type: Historic mining claim

Legal location: NW NW SE SW, SW SW, S1/2 SW NE SW, and SW SE NE SW
Section 17, T10N R4W

Owner: Private

Map: Figure 7

Description: The site consists of the remains of two structures, a foundation, a road segment and historic debris scatter located along an unnamed drainage. A shaft and various prospect pits, trenches and mining claim markers are located on the adjacent hillside which are associated with this lode. The site boundary, defined by the distribution of features and artifacts is 2600 ft east to west by 1400 ft north to south, covering an area of roughly 41.7 acres. The site is located on a north facing hillside and in an unnamed ephemeral drainage. Vegetation at the site consists of aspen, hawthorne, rose bush, prickly pear, sagebrush, thistle, milkvetch, yarrow, lupine, phlox and various wild flowers.

Features:

F-1: A subterranean structure built into the drainage bank measuring 18.6 by 18.5 ft. The structure is very overgrown with rose bushes making it difficult to see details of construction. The entrance in the drainage has a stone retaining wall and the door area is framed by square cut beams. A purlin pole is located above this. The wooden door has a small window opening. Sawn slabs were used to support the walls which have partially caved in. The interpreted function of this feature is a root cellar, though it may have been occupied as a short term shelter, or served as a powder house.

F-2: A subterranean structure built into the drainage bank which measures 19.1 ft long by 14.4 ft wide. The roof has collapsed and appears to have burned. The foundation is rock and dirt which has been piled up. Wood boards and poles are in the structure itself and outside the entrance.

F-3: A square dirt and rock foundation which measures 28.9 ft by 19.4 ft. The foundation is split into two sections by a mound of dirt. Scattered debris lies around the feature.

F-4: A segment of road which accesses the property. It is about 16 ft wide and the edges have been delineated with stones in the drainage area.

F-5: A prospect pit 13.4 ft by 8.3 ft by 2 ft deep which has no waste rock pile (probably a blast crater associated with artillery fire from early days of Fort Harrison, but also possibly a dynamited prospect hole). F-6: A series of three mineral claim cairns, two marked Gold Coin and one labeled Jerry #2, NE Corner. F-7: A historic mineral claim cairn made of local rock with a square post labeled Silver Coin 112/116.

F-8: Two adjacent prospect pits containing wood debris and three bricks. The bricks were embossed "Kessler-Helena" and "St. Louis-Lacledge." Pit A, 4 by 4 by 4 ft deep is just south of Pit B, 3 by 3 by 3 ft deep. The waste rock pile is on the north side and measures 25 ft in diameter by 2 ft high.

F-9: Clustered prospect pits and trench. A prospect pit 4 ft deep by 5 ft in diameter lies on the west side of a prospect trench is 4 ft wide by 30 ft long by 3 ft deep and contains wood debris. An adjacent prospect pit is 10 ft deep by 10 ft in diameter with a waste rock pile on the north side 15 ft wide by 36 ft long. A few yards to the northwest is a prospect pit 4 by 10 by 4 ft deep.

F-10: A clustered series of prospect pits, trenches and waste rock piles. Pit A, 6 ft deep by 15 ft in diameter, is uphill from Pit B, 6 ft deep by 6 ft in diameter. Below Pit B is Pit C, 3 ft deep by 6 ft in diameter, and Pit D, 4 ft deep by 4 ft in diameter. Below Pit D is Pit E, 10 ft deep by 4 ft in diameter, and below that is Pit F, 13 by 15 ft by 5 ft deep, with a waste dump on the north side, 15 ft wide by 32 ft long. Pit F contains lumber debris. A few yards to the west of pit F is a prospect trench 2 ft wide by 2 ft deep by 30 ft long. At the bottom of the trench is a pit G, 4 by 6 by 3 ft deep. Downhill a few yards from that is pit H, 4 by 6 by 3 ft deep and containing wood debris. On the east side of pit H is Pit J, 4 by 7 ft with an 8 by 12 waste rock pile on the north side.

F-11: An isolated prospect pit measuring 15 ft by 10 ft in diameter.

F-12: A prospect shaft with a modern iron grate cap. The shaft collar measures 30 ft by 30 ft. It has a dump measuring 93 ft from shaft to the top of the dump toe. The waste rock dump toe is 15 ft high.

F-13: A prospect adit measuring 30 ft by 4 ft in diameter. F-14: A prospect pit measuring 8 ft by 10 ft in diameter. F-15: A series of three historic mining cairns running upslope. Each has a base made of local rock with a square post. Two are labeled "Gold Coin" and the third and lowest is "Jerry #2 - NE corner."

Artifacts: Artifacts observed include a 1933 Chevrolet car body, purple glass bottle base fragment "Syrup CO, CO, CAL", wood debris, Red Wing crockery fragments, bricks, brown glass, window glass, spikes, metal spring, rubber boot, green glass, brown glass base "P.D & CO 395", square nails (cut), china, aqua glass, barrel hoops, ribbon wire, dark amber bottle base fragment embossed "A.B.C. CO. A5", tin sheeting, green bottle base fragment, embossed "7850 C5", tin basin, two strand barb wire, tin stove pipe chimney hole insert, stove pipe lengths and opaque glass fragments. Additionally, and unrelated to the mining component, several shrapnel fragments of historic age were observed. These date to W.W.I or W.W.II era artillery exercises conducted by Fort Harrison. The Chevrolet may have been hauled in by the military as a range target, for its remains are riddled with .30 and .50 caliber, as well as jagged shrapnel holes.

Testing: The nature of the site precluded the need for extensive subsurface testing. The entrance area of Feature 1, and the floor center of Features 2 and 3 were tested with 30 by 30 by 30 cm shovel tests which revealed rocky ground with no soil deposition, and no subsurface cultural material. The majority of feature types present are not associated with a focus of activity or extended occupation. Much of the site setting is erosive; being on a sloping ground with thin rocky soil and bedrock outcrops.

History: The Silver Hill Lode was patented to Joseph Parent, et al. on August 2, 1890. The 1890 Mineral Survey Plat (no. 3079) shows a discovery shaft and another shaft at the lode, valued at \$1524.00. The original name on the GLO plat, Silver Hill Lode and Mill Site, suggests plans were in place for a mill, but the mill was never developed. No information on production or underground workings is available. The survey for this lode was canceled December 28, 1990.

Integrity: The site has poor integrity. No standing structures remain. Two remaining dugout structures are partially collapsed. A modern water trough and salt station have been placed in the drainage, and a barbed wire fence designed to protect a spring / riparian area bisects the site. The site retains integrity of location and association, however little remains of the surface features and the underground workings appear to be minimal.

NRHP Eligibility: The claim is representative of early lode mining in the area although it was never one of the major mines in the Blue Cloud Mining District. Work at the mine was mostly exploratory and no major veins were discovered. The site is unlikely to yield any additional information important to local history. The site is not associated with any important historical event, nor is it associated with persons of historical prominence. No examples of unique or archetypal technology or architecture are present on the site. The site has no subsurface potential to reveal important historical information and is not recommended to be eligible for the NRHP under any Criterion.

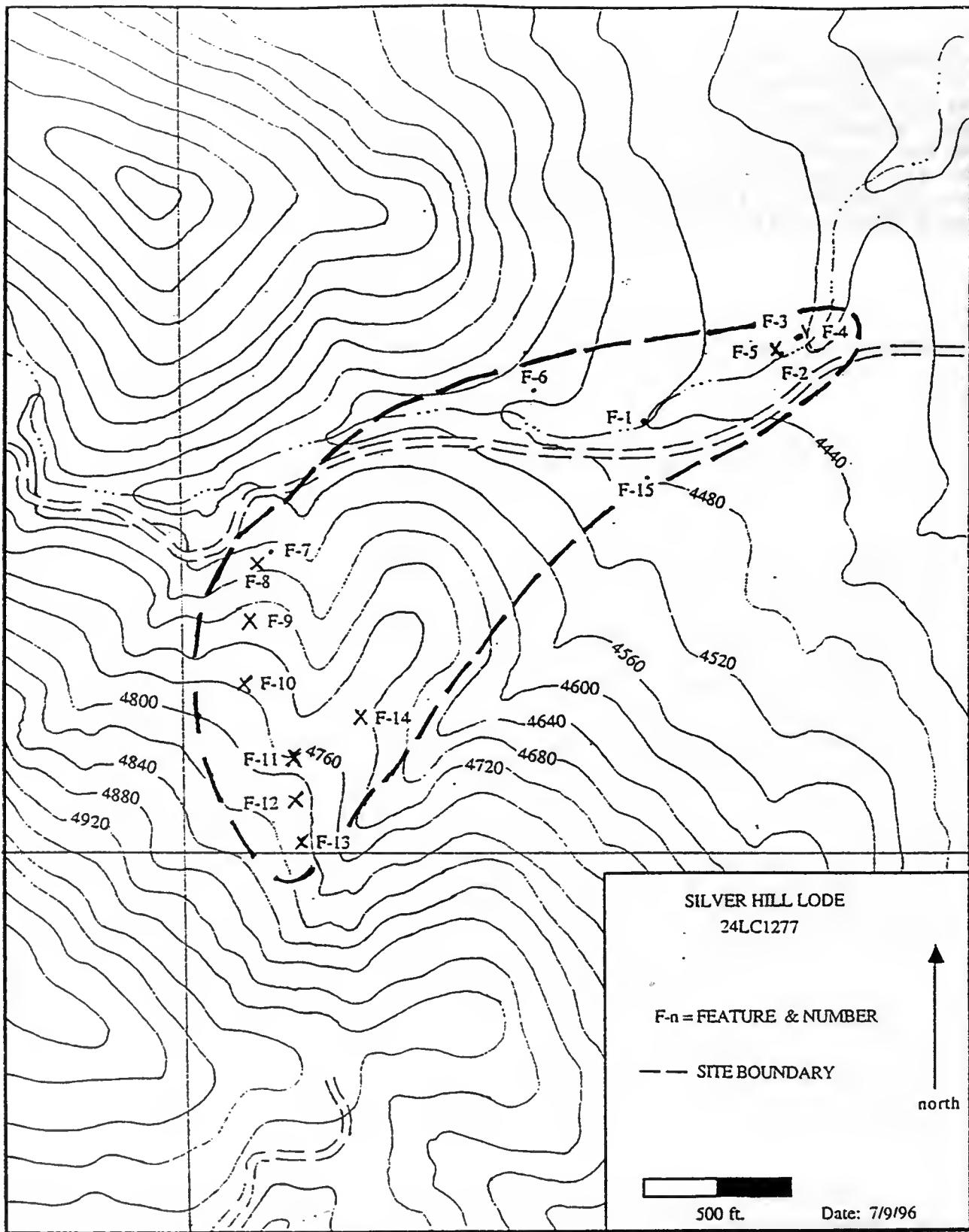


Figure 7: Site sketch map of the Silver Hill Lode - 24LC1277.

Nora Darling - 24LC1278

Site type: Historic mine

Legal location: E1/2 SW SW NW, N1/2 NW SW, SE SW NW, and W1/2 NW NE SW,
Section 17, T10N R4W

Owner: Private

Map: Figure 8

Description: The site consists of a large group of prospect pits situated south of Stemwinder Hill on the Nora Darling Lode. Very few artifacts were found, providing little information on the lode. The triangle shaped site boundary, defined by the distribution of features and artifacts is 1700 ft east to west by 1500 ft north to south, covering an area of roughly 29 acres. The site is located on hillsides overlooking an unnamed ephemeral drainage. The majority of the prospects are aligned along a fault or contact zone where mineralization was being explored. Vegetation at the site consists of aspen, hawthorne, rose bush, prickly pear, sagebrush, thistle, milkvetch, yarrow, lupine, phlox and various wild flowers.

Features:

F-1: prospect pit 18 by 15 by 3 ft deep with a waste rock pile 2 by 12 ft in diameter. F-2: prospect pit 12 by 12 by 3 ft deep. F-3: prospect pit 15 by 12 by 3 ft deep. F-4: prospect pit 15 by 12 by 3 ft deep with a waste rock pile 15 by 9 by 2 ft. F-5: Waste pile 33 by 24 by 10 ft. F-6: Waste pile 15 by 12 by 3 ft. F-7: prospect pit 45 by 12 by 5 ft. F-8: Waste pile 57 by 30 by 15 ft. F-9: prospect pit 21 by 6 by 3 ft deep. F-10: prospect pit 27 by 6 by 2 ft deep. F-11: prospect pit 36 by 18 by 5 ft deep. F-12: Waste pile 21 by 18 by 3 ft. F-13: prospect pit 24 by 15 by 4 ft deep. F-14: prospect pit 6 by 6 by 2 ft deep. F-15: prospect pit 15 by 3 by 15 ft deep. A 25 by 20 ft waste rock pile is on the north side of the pit. F-16: prospect pit 2 ft deep by 6 ft in diameter. F-17: A prospect pit 6 ft deep by 8 ft in diameter, with a waste rock pile 6 ft high by 20 ft long on the north side of the pit. F-18: A dozer cut 275 ft long by 10 ft wide that cuts through a waste rock dump (F19). F-19: Waste rock dump 30 by 40 ft in diameter, probably associated with an adit, now obliterated by dozer work. F-20: Waste rock dump 40 by 50 ft, probably associated with an adit, now obliterated by dozer work. F-21: prospect pit C (2 ft deep by 12 ft in diameter) has a waste rock pile 15 by 12 by 3 ft high. F-22: prospect pit 5 ft deep by 8 ft in diameter. F-23: prospect pit 2 ft deep by 3 ft in diameter. F-24: prospect pit 2 ft deep by 8 ft in diameter. F-25: prospect pit 2 ft deep by 6 ft in diameter. F-26: prospect pit 3 ft deep by 4 ft in diameter. F-27: prospect pit 8 ft deep by 10 ft with a waste rock pile 6 ft high by 30 ft in diameter. F-28: prospect pit 6 ft deep by 12 ft in diameter. F-29: Prospect pit 4 ft deep by 4 ft in diameter. F-30: prospect pit 6 ft deep by 6 ft in diameter. F-31: prospect pit 4 ft deep by 6 ft in diameter. F-32: prospect pit 3 ft deep by 3 ft in diameter. F-33: prospect pit 4 ft deep by 6 ft in diameter. F-34: prospect pit 2 ft deep by 24 ft in diameter. F-35: prospect shaft 10 ft deep by 20 ft. The waste rock pile is 15 by 40 ft in diameter. F-36: prospect pit 2 ft deep by 8 ft in diameter. F-37: prospect pit 3 ft deep by 3 ft in diameter. F-38: prospect pit 20 ft deep by 25 ft with a waste rock pile 37 by 20 ft in diameter. F-39: prospect pit 4 ft deep by 4 ft in diameter. F-40: prospect pit 5 ft deep by 10 ft in diameter. F-41: prospect pit 7 ft deep by 7 ft in diameter. F-42: prospect pit 4 ft deep by 40 ft in diameter. F-43: prospect pit 10 ft deep by 10 ft in diameter. F-44: Trench 6 ft deep by 60 ft in diameter. F-45: Waste dump 6 ft deep by 14 ft in diameter. F-46: Waste pile 28 ft deep by 60 ft in diameter. F-47: prospect pit 4 ft deep by 6 ft in diameter. F-48: prospect pit 6 ft deep by 6 ft in diameter. F-49: Dozer cut 50 by 50 ft. On the south side there is a culvert with a steel covering, possible a sealed ventilation raise for underground workings. F-50: prospect pit 8 ft deep by 8 ft in diameter. F-51: Prospect pit 7 ft deep by 15 ft in diameter. The associated waste rock pile is 26 by 38 ft in di-

ameter. F-52: prospect pit 7 ft deep by 10 ft in diameter. F-53: prospect pit 4 ft deep by 10 ft in diameter.

F-54: Leveled area, possibly a powder house location, 17 ft long by 7 ft wide. The earthen sidewalls are 4 ft thick and the back wall is 8 ft thick.

F-55: A shaft 30 ft in diameter by 60 ft deep, with a horseshoe shaped waste rock dump (F-56) 45 ft around the outside and 3 to 15 ft thick.

F-57: A prospect pit 8 ft deep by 15 ft in diameter. F-58: A prospect pit 7 ft deep by 10 ft in diameter. F-59: A prospect pit 18 by 15 by 3 ft deep with a waste rock pile 12 by 2 ft in diameter. F-60: A prospect pit 12 by 12 by 3 ft deep. F-61: A prospect pit 15 by 12 by 3 ft deep. F-62: A prospect pit 15 by 12 by 3 ft deep with a waste rock pile 15 by 9 by 2 ft high. F-63: A waste rock pile 33 by 24 by 10 ft high. F-64: A waste rock pile 15 by 12 by 3 ft high. F-65: A prospect pit 45 by 12 by 5 ft deep. F-66: A waste rock pile 57 by 30 by 15 ft high. F-67: A prospect pit 21 by 6 by 3 ft deep. F-68: A prospect pit 27 by 6 by 2 ft deep. F-69: A prospect pit 36 by 18 by 5 ft deep. F-70: A waste rock pile 21 by 18 by 3 ft high. F-71: A prospect pit 24 by 15 by 4 ft deep. F-72: A prospect pit 6 by 6 by 2 ft deep. F-73: prospect pit 4 ft deep by 3 ft in diameter with the waste rock pile on the east side. The pit is full of logs and cut logs with rose bush growing inside. Above is a claim marker for the Silver Coin.

Artifacts: Artifacts observed include wood debris, metal fragments, corrugated metal culvert, and round wire nails.

Testing: Feature 54, a leveled area, was examined with a 30 by 30 by 30 cm shovel test which yielded no cultural material. The other feature types at this site are not associated with any focus of activity, extended occupation or other activity which would produce a buried cultural deposit. The steep and rocky nature of the site precludes soil deposition. Subsurface testing is not a particularly useful means of evaluating this site type.

History: Little information is available on this lode. Surface workings seem to indicate more prospecting than actual lode development. The 1897 Mineral Survey Plat map (no. 5091) of the "American Mining Company's" Nora Darling Lode lists "Disc. [discovery] shaft, tunnel and two shafts valued at \$3970.00." The Nora Darling has no record of production.

Integrity: No structures remain at the site. While the site retains integrity of setting, it lacks any distinctive features and specific historic context. It is likely that the simple prospect features represent several episodes of exploration. Very few artifacts remain that would contribute information to the history of mining in the area.

NRHP Eligibility: The Nora Darling lode was never an important producer and little information is available on production. The site is not associated with important historical events nor is it associated with persons of historical prominence. No examples of unique or archetypal technology or architecture are present on the site and it has no subsurface potential to reveal important historical information. The site is not recommended to be eligible for the NRHP under any Criterion.

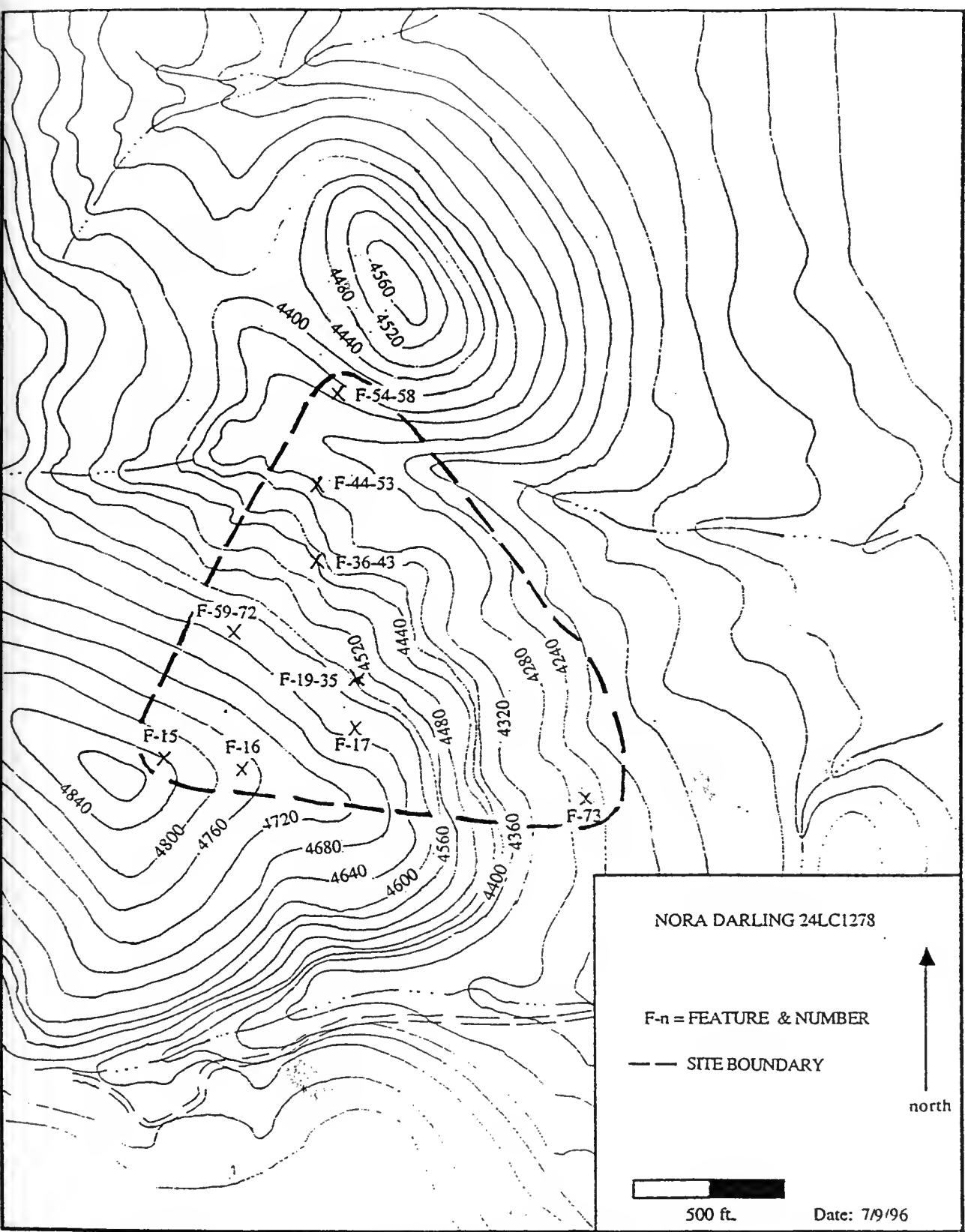


Figure 8. Site map of Nora Darling - 24LC1278

Silver Coin - 24LC1279

Site type: Historic mine

Legal location: W1/2 NW1/4 Section 20, T10N R4W

Owner: Private

Map: Figure 9

Description: The site consists of 26 mining and mineral exploration features. Modern and historic features are integrated throughout the site. The site boundary, defined by the distribution of features and artifacts is 850 ft east to west by 2450 ft north to south, covering an area of roughly 48 acres. The site is located on the sides and top of a series of bald hills. The prospects follow an outcrop along a fault line which contained silver and some gold. Vegetation at the site is wheatgrasses and fescues.

Features:

F-1 is a partially collapsed structure apparently used as for ore storage and loading. It is constructed of cut lumber beams, planks and poles. The structure is 22 by 10 ft.

F-2 is a prospect adit measuring 20 ft by 7 f. Wood debris is scattered around the portal.

F-3 is a collapsed adit and dozer prospect area. The adit trench is 36 ft long. F-4 is a prospect measuring 15 ft long by 6 ft in diameter by 4 ft deep. F-5 is a prospect pit measuring 3 ft by 3 ft in diameter. F-6 is a prospect measuring 4 ft by 3 ft in diameter.

F-7 is a prospect pit measuring 2 ft by 2 ft in diameter., with wood debris scattered around it. F-8 is a shaft with a modern iron grate cap. The shaft collar measures 12 ft deep by 8 ft in diameter. F-9 is a collapsed shaft 12 ft deep by 7 ft in diameter. F-10 is a prospect trench measuring 40 ft long by 4 ft wide. F-11 is an open inclined shaft 4 ft by 6 ft and of unknown length. F-12 is a modern tin culvert with a metal screen apparently functioning as a ventilation raise. F-13 is a prospect shaft with a modern iron grate cap. The shaft is 20 ft by 10 ft with an undetermined depth. Wood fencing material is scattered around the feature. F-14 is a prospect pit and connected prospect trench. The pit is 8 ft by 10 ft by 3 ft deep and the trench measures 30 ft long by 4 feet wide by 6 feet deep. F-15 is a shaft with a modern iron grate cap. The shaft collar is approximately 8 ft by 6 ft with an unknown depth. The cap is 12 ft by 12 ft. Wood fencing material is scattered around the feature. F-15a is a prospect pit 8 ft by 8 ft in diameter. F-16 is composed of two prospect pits, one 4 ft by 2 by 2 ft deep and the second measuring 10 ft by 4 ft by 3 ft deep.

F-17 is an adit with an ashlar bond brick portal. It has a steel frame door entrance with rebar screening. The doorway is 4 ft high. The portal is 7 ft tall and 5 ft wide. A 50 ft long loadout with abandoned ore car tracking connects the adit to a waste rock dump. The top of the waste rock dump to the toe is 20 ft. The dump is 12 ft wide at the toe.

Artifacts: The only remaining artifact is lumber debris.

Testing: The nature of the site precluded the need for subsurface testing. The site setting is erosive and has been reworked by bulldozers. The soil is thin and rocky leaving little chance for subsurface artifacts. Mineral prospects are not associated with extended occupation or a focus of activity and so yield little or no cultural deposition.

History: The Silver Coin mine primarily produced silver ore on a few verifiable occasions throughout the years. Tony Maras leased the Silver Coin from Owen Byrnes et al., in 1928. Maras developed the mine through drifts, crosscuts, and two tunnels that aggregated

400 feet in length. Louis Peura operated the mine at a much later date in 1957-1958. Peura produced an undisclosed amount of gold and zinc in addition to silver. The written record on the Silver Coin indicates a rather insignificant past, despite an optimistic U.S.G.S. statement that "the Silver Coin...produced a considerable amount of rich silver ore." (Pardee and Schrader, 1933; Stout and Ackerman, 1959).

Integrity: Many of the features at this site are post-1945, and are well intermixed with the older features. None of the older features retain integrity of design, workmanship, setting, materials, or feeling. All of the features have been compromised by modern mineral exploration activity and natural deterioration. This essentially destroys the general integrity of the original mining area.

NRHP Eligibility: The site is lacking integrity and is not recommended eligible to the NRHP under any criteria. The site has no record of production and was not of local economic importance (Criterion A). The property is not associated with the lives of persons important within a local, state, or national historic context (Criterion B). The pre-1945 features do not demonstrate characteristics of unique or unusual design and they are not collectively or individually eligible from an architectural perspective (Criterion C). The property has no potential to yield further significant information important to our understanding of local history (Criterion D).

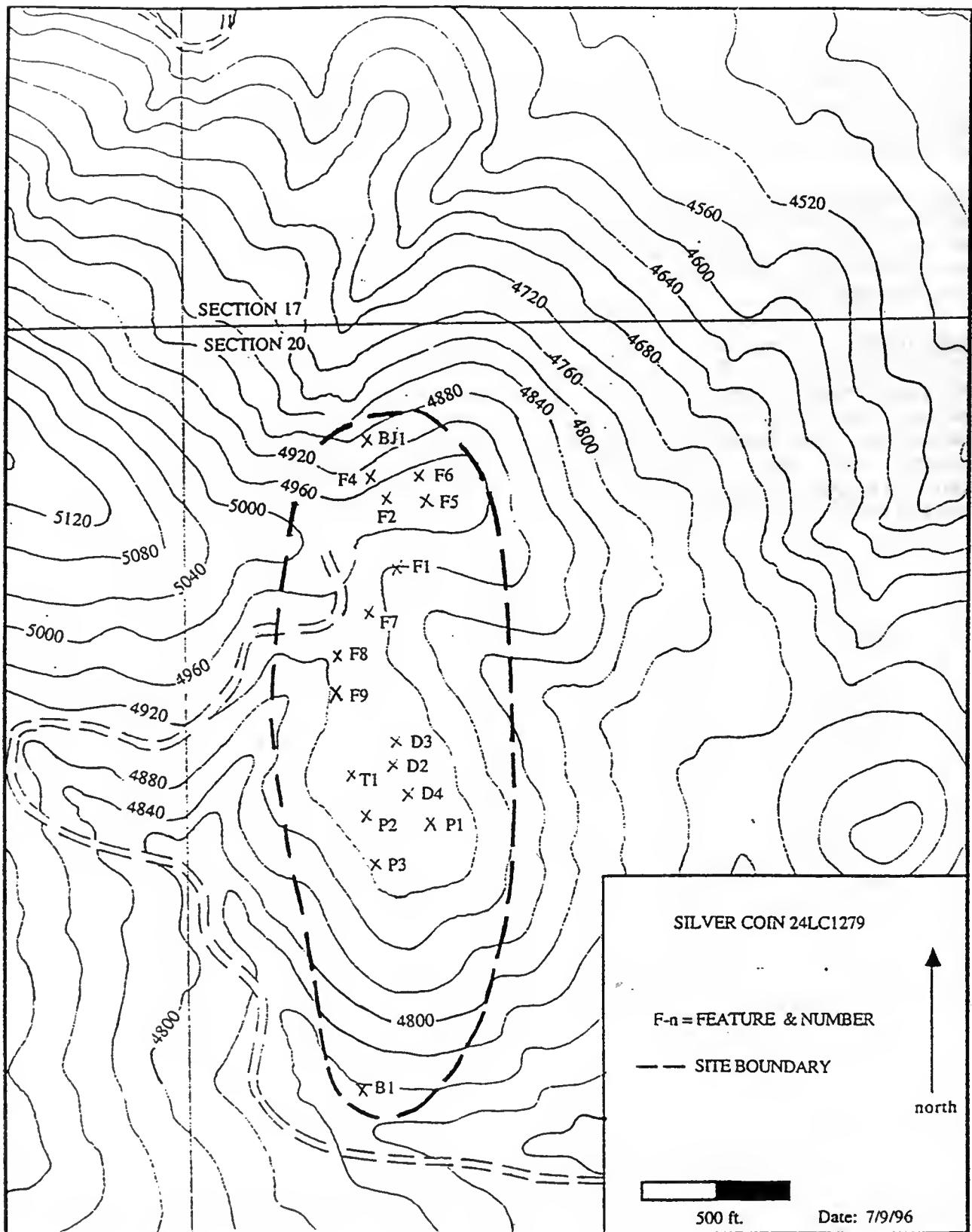


Figure 9. Site map of Silver Coin Lode, 24LC1279

Stemwinder Lode - 24LC1280

Site type: Historic mine

Legal location: S1/2 NW NW; SE NW NW NW; SW NE NW NW; N1/2 NW SW NW;
NW NE SW NW Section 17, T10N R4W

Owner: Private

Map: Figure 10

Description: This mining and mineral exploration site is located on the north and south slopes of Stemwinder Hill. It consists of several mining related features of both historic and modern age. The site boundary, defined by the distribution of features and artifacts is 1150 ft east to west by 1550 ft north to south, covering an area of roughly 41 acres. The site is located on Stemwinder Hill and in the drainage to the north. Vegetation at the site consists of rose bush, prickly pear, sagebrush, thistle.

Features:

F1 is a prospect pit measuring 15 by 9 by 3 ft deep. A piece of a cast iron stove is located near the pit. F-2 is a rock cairn for a claim marker post. It is 3 by 6 ft in diameter by 1 ft high. F-3 is a similar rock cairn 4 by 3 by 1 ft high. F-4 is a prospect pit 10 by 4 by 3 ft deep. F-5 is a prospect pit 10 by 6 by 1 ft deep. F-6 is a series of four adjoining small prospect pits measuring 9 ft by 9 ft, 18 ft by 12 ft, 9 ft by 9 ft, and 12 ft by 12 ft, and ranging from 3 to 1 ft deep. F-7 is a prospect pit measuring 12 by 6 by 3 ft deep. F-8 is a prospect shaft measuring 15 ft by 18 ft with two adjacent prospect pits measuring 15 ft by 13 ft and 9 ft by 15 ft in diameter. F-9 is a prospect pit measuring 24 ft by 9 ft. F-10a is a depression measuring 13 ft by 14 ft filled with rose bushes, stone, and window glass. Feature F-10b is a depression 17 ft by 12 ft filled with wood debris. Two prospect pits F-10c and F-10d are nearby measuring 12 ft by 12 ft and 14 ft by 11 ft. There are stove pieces scattered near the second prospect pit.

F-11 is a modern concrete foundation and wood plank platform 10 ft by 15 ft. Cut lumber, metal, brick, stove pipe, and nails are scattered around the feature. F-12 is a prospect trench 118 ft long by 4 ft wide by 5 ft deep. F-13 is a prospect pit measuring 5 ft deep by 10 ft in diameter. F-14 is a concrete pad, 20 ft by 11 ft in a non-symmetrical shape. The area of F-15, a 10 x 10 ft leveled area, is littered with cut lumber, nails, and broken glass. F-16 is a prospect pit 20 ft in diameter and 6 ft deep. F-17 is a shaft and debris dump. The shaft collar is 25 ft by 20 ft with an adjoining concrete pad. The trash dump area is 10 ft by 5 ft and contains concrete, wire, wood, and modern appliances. F-18 is a collapsed 12 ft by 8 ft structure on a concrete pad. F-19 is a collapsed structure approximately 10 ft by 20 ft. Stove pipe, cut lumber, and nails are scattered around it. F-20 is a prospect pit 15 ft by 15 ft. F-21 is a dump 27 ft by 10 ft consisting primarily of wood debris. F-22a through 22d are a series of small adjacent prospect pits measuring 15 ft by 15 ft, 6 ft by 6 ft, 7 ft by 6 ft, and 7 ft by 9 ft respectively.

F-23 is a stone and earth foundation 50 ft long by 19 ft wide. Wood, wire, and nail debris are scattered around and within the feature. F-24 is a prospect pit 18 ft by 12 ft with a dump 36 ft by 6 ft by 2 ft. Iron and wood debris is scattered around the site. F-25 is a series of prospect pits and dumps. F-25a is a pit 16 ft by F-14 ft with a dump 9 ft by 9.5 ft 4 ft deep. F-25b is a pit 13 ft by 8 ft with a dump 10 ft by 12 ft by 6 ft deep. F-25c is a pit 12 ft by 10.5 ft, with a dump 9 ft by 3 ft by 1.5 ft. F-25d is a pit 21 by 18 by 8 ft deep, with a dump 12 by 3.5 by 3 ft high and another dump 30 ft by 9 ft by 6 ft high. F-25f is an open shaft measuring 15 ft by 15 ft, with unknown depth.

F-26 is composed of a partially constructed powder house with dimensions of 9 by 7 ft. A 2 ft tall by 7 ft long uncoursed random concrete bond stone wall exists at the mouth of the cut out. Adjacent to this feature is a prospect pit 15 ft by 8 ft by 5 ft deep, with a dump measuring 15 ft high at the toe. Another adjacent prospect pit is 10 ft by 7 ft by 4 ft deep.

Artifacts: Artifacts observed include cast iron stove pieces, wood, round wire nails, wire, window glass, green bottle glass, iron hinges, tin stove pipe, and nails. Artifacts suggest a 1920s or 1930s occupation.

Testing: The nature of the site precluded the need for extensive subsurface testing. A 30 by 30 by 30 cm shovel test at F-12 (a foundation) yielded no cultural material. The site setting is erosive and has been reworked by bulldozers. The soil is thin and rocky leaving little chance for subsurface artifacts. Mineral prospects are not associated with extended occupation or a focus of activity and so yield little or no cultural deposition.

History: The Stemwinder Lode (and Stemwinder Lode No. 2), were patented to Robert H. Fletcher on October 14, 1912 and August 16, 1916 (Government Land Office [GLO] Plat Mineral Survey No. 10036, 1918). Improvements as of May 16, 1918 included "two discovery shafts, five shaft cuts and a main working shaft with two drifts, valued at \$4160.00" (GLO 1918). A shaft house is indicated on the plat map, adjacent to the main working shaft.

Integrity: Many of the features at this site are post-1945, and are well intermixed with the older features. None of the older features retain integrity of design, workmanship, setting, materials, or feeling. The shaft house indicated on the GLO Plat map (1918) is completely gone. All of the features have been compromised by modern mining activity and natural deterioration. This essentially destroys the general integrity of the original mining area.

NRHP Eligibility: The site is lacking integrity and is not recommended eligible to the NRHP under any criteria. The site was part of the mining past of the Helena area. As such, it contributed to the local economy, although no more so than most other small mining enterprises in the area and is not recommended eligible under Criterion A. The property is not associated with the lives of persons important within a local, state, or national historic context (Criterion B). The pre-1945 features do not demonstrate characteristics of unique or unusual design and they are not collectively or individually eligible from an architectural perspective (Criterion C). The property has no potential to yield further significant information important to our understanding of local history (Criterion D).

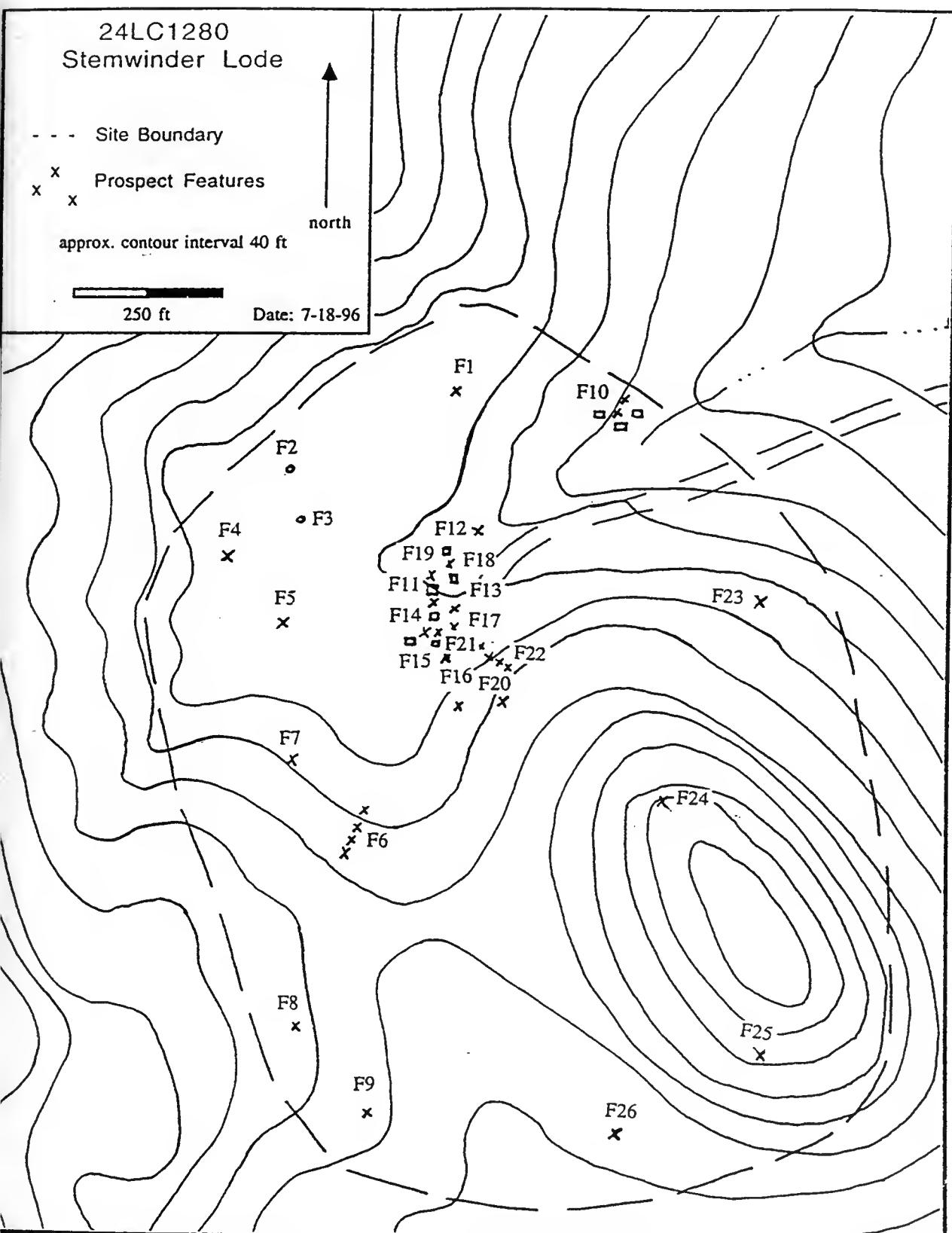


Figure 10 . Site map of Stemwinder Lode - 24LC1280.

DISCUSSION / INTERPRETATION

The Blue Cloud mining district located west of Helena saw very little lode or placer mining. The first mention of the district in mining literature occurred in 1869 when Comer & Company were reported to be operating a mill in Blue Cloud Creek (GCM 1995). In 1890 G. C. Swallow, Montana Mine Inspector, reported a 10-stamp mill working the ores of the district. During the early part of the Twentieth century a few mines were in operation in the Old Dominion Gulch area producing iron ore with gold and silver values. An anonymous lode mine was reported to have produced ore in 1934 containing gold, silver and copper (Montana Bureau of Mines n.d.). The Blue Cloud Placer Syndicate was working the drainage of the same name in 1936 using a dragline to expose the gold bearing gravels.

During the course of the investigation five mine sites were recorded and evaluated. These include the Syndicate/Grass Valley (24LC1276), Silver Hill Lode (24LC1277), Nora Darling (24LC1278), Silver Coin (24LC1279) and Stemwinder Lode (24LC1280).

These mines were prospecting and exploration efforts or small scale mining operations at best. Little historical information is available on these sites and there are no standing structures and very few artifacts. Some of the lodes were worked more than once and early mining features were destroyed. Records for the Blue Cloud mining district indicate one placer and one lode which were the main producers for the area. Many of the mines were never patented and little information is available on the level of production or years the facilities were active. Even the histories of the producing mines in the district are sketchy at best. The integrity of the mines has deteriorated by the passage of time which has destroyed surface features. Subsequent re-working of the lodes by later leases further disrupted surface features. The lack of historical documentation for the mines make it impossible to access their historical significance and determine their eligibility to the NRHP.

In addition 71 historic loci were also identified and recorded within the project area. These are all associated with mining and include claim markers, prospect pits, and earthen dams.

Two sites had been previously recorded in the study area: 24LC734 and 24LC1258. Site 24LC734 was interpreted as the remains of a 1885 era military facility, possibly a guard post (Kingsbury 1985). This site was recommended potentially eligible under Criteria A and D. A field review and re-recording of the site indicates it is most likely associated with 1880s mining and mineral exploration and is part of the Syndicate-Grass Valley Lode (recorded as 24LC1276). The features at this site were never part of Fort Harrison, which wasn't established until 1895, but the presence of soldiers at the site is possible, given its proximity to the fort.

Site 24LC1258, Helena to Deer Lodge Stage Road (also the Blackfeet City Road), is a historic stage route which passes through the northern edge of the project area. Due to poor integrity for most of its 54 mile length, the site is considered not eligible for the NRHP. A segment of the road is presently used by ranchers to access the Cherry Creek drainage area. Other segments follow county and state roadways and US Highway 12.

In summary, the proposed land purchase by MT ARNG will have no effect to cultural resources. The proposed purchase will provide the following functions: 1) a safety buffer to ensure continued use of existing small arms firing ranges, during the expected residential development of the surrounding area; 2) to provide buffers for other impacts such as helicopter noise, and; 3) to provide continued and uninterrupted access to sufficient area to conduct navigation exercises. The land under study has been almost continuously leased from the private owners and BLM during Fort Harrison's 100 year history. The current

and future use of the area have little impact to the landscape, and will probably ensure that what historic remains exist in the project area will have minimal disturbance.

REFERENCES

- Alt, David and Donald W. Hyndman
1986 Roadside Geology of Montana. Mountain Press Publishing Company, Missoula.
- Amos, Christine
1983 Cultural Resource Inventory Helena-West Montana Department of Highways Project. Report prepared for Montana Department of Highways, Helena.
- Babcock, William
1985 A cultural Resource Inventory of Green Meadow Drive. Report prepared for Montana Department of Highways, Helena.
- Bureau of Land Management
1868 General Land Office Survey Plat. Township 10 North, Range 4 West. July 8, 1868.
- 1880 Mineral Survey Plat 921, Grass Valley Lode, November 6.
- 1887 Mineral Survey Plat 2015, Syndicate Lode, August 11.
- 1890 Mineral Survey Plat 3079, Silver Hill Lode, August 2.
- 1897 Mineral Survey Plat 5091, Nora Darling Lode, American Mining Company, April 17.
- 1918 Mineral Survey Plat 10036, Stemwinder Mining Company Claim.
- 1980 Land Survey Plat. Sections 17 and 20. Township 10 North, Range 4 West.
- Cushman, Dan
1973 Montana: The Gold Frontier. Great Falls, Montana.
- Davis, Leslie B.
1984 *Current Research in the Pleistocene*, "Late Pleistocene to Mid-Holocene Adaptations at Indian Creek, West-Central Montana Rockies."
- Ferguson, David and Patrick Rennie
1992 The Prehistoric Cultural use of the Missouri River Corridor, Lewis and Clark County, Montana: 10,000 BC - AD 1700. Multiple Properties Documentation Form prepared for the Montana State Historic Preservation Office, Helena.
- Frison, George C.
1978 *Prehistoric Hunters of the High Plains*. Department of Anthropology. University of Wyoming. Academic Press. New York.
- 1991 *Prehistoric Hunters of the High Plains*. Department of Anthropology. University of Wyoming. Academic Press. New York.
- GCM Services
1995 Blue Cloud mining district: technical version. Prepared for Abandoned Mine Reclamation Bureau, Montana Department of State Lands by GCM Services, Butte.

GCM Services, Inc.

1995a *Cultural Resource Inventory and Assessment: Sevenmile Creek Tipi Ring site 24LC707 at Fort W. H. Harrison Military Reservation, Lewis and Clark County, Montana.* Report Prepared for Montana Army National Guard, Department of Military Affairs, State of Montana, Helena.

1995b Helena mining district: public version. Prepared for Abandoned Mine Reclamation Bureau. Montana Department of State Lands by GCM Services, Inc. Butte.

1995c Scratchgravel Hills mining district: public version. Prepared for Abandoned Mine Reclamation Bureau. Montana Department of State Lands by GCM Services. Butte.

1995d Blue Cloud mining district: public version. Prepared for Abandoned Mine Reclamation Bureau. Montana Department of State Lands by GCM Services. Butte.

Government Land Office Maps (early series),

1868 Bureau of Land Management Records Office, Butte and Billings, Montana, July 8, 1868

Herbort, Dale

1987 *Montana City Archeological Zone, 24JF697.* National Register of Historic Places Nomination National Historic Preservation Grants (SP-30-86-10013A-5 and SP-30-87-20024-6) Montana State Historic Preservation Office, Helena.

Husted, Wilfred

1992 A Cultural Resource Inventory and Assessment of a Small Parcel at Fort William Henry Harrison near Helena, Lewis and Clark County, Montana. Report prepared for 96th Army Reserve Command, Fort Carson.

Kingsbury, Lawrence A.

1985 Cultural Resource Inventory Record: 24LC734. Bureau of Land Management, Helena.

Kurtz, Leanne

1996 State Historic Preservation Office, letter, Helena, Montana.

McCleod, Milo C.

1987 Cultural Resource Assessment: Fort Harrison, Montana. Report on File at Montana State Historic Preservation Office, Helena.

1985 Cultural Resource Inventory Project Report of the Proposed State Cemetery, Fort Harrison, Montana. Report on File at Montana State Historic Preservation Office, Helena.

Montana Bureau of Mines and Geology

n.d. Vertical files for mining districts, Montana Tech, Butte.

Mulloy, William T.

1958 *A preliminary historical outline for the Northwestern Plains.* University of Wyoming Publications 22(1).

Novatne, Carol

1983 Site report 24LC707 on file in Archaeology Records of University of Montana, Missoula.

Park, John

1993 Montana State Office Site Form 24LC1113, Bureau of Land Management, Helena.

Payne, Gene

1973 Vegetative Rangeland Types in Montana. Montana Agricultural Experiment Station Bulletin 671, Montana State University, Bozeman.

Read, Lt. Colonel Raymond

1990 Fort William Henry Harrison, Helena, Montana; A Capsule History of the Post. Report on File at Montana State Historic Preservation Office, Helena.

Rennie, Patrick

1995 Site Record Form, 24LC1258. On file at Montana Department of Natural Resources and Conservation, and Montana State Historic Preservation Office, Helena.

Wood, Gar

1993 Cultural Resource Management Report, Fort William Henry Harrison, Phase 2. Prepared for the Department of the Army and Air Force National Guard Bureau, Helena.

1994 Cultural Resources Survey of Fort William Henry Harrison, Montana Army National Guard, Department of Military Affairs, State of Montana, Helena.

1995 Cultural Resources Survey Fort William Henry Harrison, Montana Army National Guard, Department of Military Affairs, State of Montana, Helena.

Wolle, Muriel Sibell

1963 Montana Pay Dirt. Sage Books, Athens, Ohio.





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